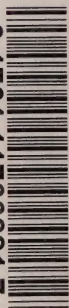


PREPARING CANADA FOR A DIGITAL WORLD

FINAL REPORT OF
THE INFORMATION HIGHWAY
ADVISORY COUNCIL


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**FINAL REPORT OF
THE INFORMATION HIGHWAY
ADVISORY COUNCIL**

September 1997

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PREFACE

The Information Highway Advisory Council (IHAC) reconvened in June 1996 to begin the second phase of its mandate. Nine months earlier, IHAC had submitted to the federal Minister of Industry John Manley its report Connection Community Content (September 1995), which set out recommendations for an Information Highway strategy for Canada. At that time, Minister Manley had invited IHAC members to devote another year to giving the government and Canadians further advice on how to carry forward the policy agenda for the Information Highway.

But IHAC's work had begun more than three years ago as a result of a commitment in the Throne Speech of January 1994 to develop a Canadian strategy for the Information Highway. Shortly afterward, in March 1994, Minister Manley established the Information Highway Advisory Council to provide advice on major issues related to that strategy.

The membership of the Council represents a diverse range of interests. Members come from the telecommunications, broadcasting and information technology industries and institutions, from the artistic, creative and educational communities, and from consumer and labour organizations. Its 29 members are:

Neil Baker	John MacDonald
André Bureau	Terry Matthews
André Chagnon	John McLennan
Bob David	Gerry Miller
Mary Dykstra Lynch	Jean-Claude Parrot*
Bill Etherington	Anna Porter
Francis Fox	Derrick Rowe
John Gray	Guy Savard
George Harvey	Irene Seiferling
Brian Hewat	Gerri Sinclair
Elizabeth Hoffman	Charles Sirois
Douglas Holtby	David Sutherland
David Johnston	Gerry Turcotte
Veronica Lacey	Mamoru Watanabe
	Colin Watson

We wish to thank Minister Manley and the Minister of Canadian Heritage, Sheila Copps, for their generous support of our efforts, as well as officials in their respective departments for their able assistance and advice. We also collectively thank the *ex officio* members of Council steering committees and the staff of our secretariat for their dedication, hard work and expert help.

In 1994, the government sought advice on 15 specific issues — covering the spectrum of economic, social and cultural questions surrounding the Information Highway. The government also set out three objectives to guide us in our deliberations:

- creating jobs through innovation and investment in Canada
- reinforcing Canadian sovereignty and cultural identity
- ensuring universal access at reasonable cost.

* Jean-Claude Parrot supports the recommendations in Chapter 7. In view of his minority report in Phase I, he chose to abstain from discussions of and support for the other recommendations.

Five principles also shaped IHAC's approach to the Information Highway:

- an interconnected and interoperable network of networks
- collaborative public and private sector development
- privacy protection and network security
- competition in facilities, products and services
- lifelong learning as a key design element of Canada's Information Highway.

These objectives and principles are as relevant to the Council's current work in this second phase of its mandate as they were to its Phase I deliberations. By guiding individual IHAC members toward the broader interests of Canadians, they provided the foundation for our September 1995 report, *Connection Community Content*, which contained about 300 recommendations and subrecommendations for action by governments, the private sector and individual Canadians.

In May 1996, the federal government issued *Building the Information Society: Moving Canada into the 21st Century*, which contained a far-ranging Canadian strategy for the Information Highway. More than 30 federal departments and agencies participated in its development. The document indicated that action was either under way or completed in relation to roughly two thirds of IHAC's recommendations. That figure now approaches 80 percent. Moreover, the government made serious and specific commitments in key areas such as convergence of broadcasting and telecommunications, a Canadian content strategy, electronic commerce, a health information network, lifelong learning, access, privacy and security and transforming government itself into a model user of information technology.

The Council was reconvened for this second phase in June 1996 to encourage continuing action on these commitments. We concentrated on two tasks:

- **advancing the public policy agenda** by advising the government on outstanding issues and concerns related to the Information Highway
- **reporting on Canada's progress** in the transition to an information society and a knowledge-based economy.

At the outset of this new mandate, the Council identified a major thematic concern: the power of communications has destroyed distance and is injecting global realities into our living rooms, our workplaces — indeed, the entire realm of Canadian social, economic and cultural relations. Canadians now live in a world without borders. Our purpose in writing this report is to prepare Canada for this new digital world.

In relation to the Information Highway, the most dramatic development in the past two years has been the continuing, exponential growth of the Internet, both here in Canada and around the world. Our efforts over the past year have focussed on this phenomenon and its meaning for the Information Highway.

Within this broader context, we have been asked to provide specific advice on five Information Highway issues, and we struck steering committees to address each of them: economic growth, the Internet, access, Canadian content, and learning and the workplace.

Over the course of four meetings between June 1996 and April 1997 and at many teleconferences and steering committee meetings, we wrestled with these five issues to provide clear, practical advice to policy makers.

This report is the fruit of our labours. We are especially grateful to Minister Manley and his Cabinet colleagues for giving us this opportunity to provide our advice to Canadians.

Our message is simple. We live in a remarkable period of history in an extraordinarily blessed nation. *Carpe Diem*. Let us seize the day.

A handwritten signature in dark ink, appearing to read "David Johnston". The signature is fluid and cursive, with a large, stylized initial "D".

David Johnston, Chair
September 1997

Chapter I

TOWARD A SOCIETY BUILT ON KNOWLEDGE

A social, economic and cultural revolution is now transforming the world. A new game is starting, and the older rules no longer apply. It is imperative that Canada move quickly to meet the challenges and seize the opportunities of this new age.

If anything, the pace of change has accelerated since the Information Highway Advisory Council began its work three years ago. Since that time, much has been accomplished by Canadian governments, industry and individuals. Much remains to be done, however, and our sense of urgency has not abated.

What is this revolution? What challenges does it pose? What opportunities does it present? How can Canadians take advantage of this profound shift in social and economic paradigms?

Our answers to these questions are the subject of this report.

THE NEW RULES OF THE GAME

Most observers see information and communications technologies as key agents in the far-reaching changes that are overtaking every society on earth as the world enters the new millennium. They predict that the augmented power of these technologies is now carrying everyone toward a society that is very much different from the industrial one that has prevailed in the developed world for most of the past two centuries, which was based on the exchange of tangible goods and services.

These powerful new technologies are becoming the infrastructure for a new 21st-century society, which is based on the exchange of intangibles — ideas, information, knowledge and intelligence. There are many terms for this new world — “information society,” “knowledge-based economy,” “digital economy,” “post-industrial society.”

Whatever name applies, the defining features of this new era are always the same. Physical distance will disappear as a factor in human relations, and consequently the world will become a much smaller place. The creation, manipulation and sharing of information and knowledge will become an overriding human imperative.

The promise of these changes is readily apparent.

- No longer will distance pose an obstacle to economic development, social intercourse, learning, voluntary action, adequate health care, business success or full participation in society and Canada’s national cultural dialogue.
- Knowledge will become increasingly available to everyone, allowing us all to make wiser decisions in all aspects of our lives — from business to government to health care to education to work to our everyday existence.
- Everyone will be not only a consumer of knowledge and content, but also a creator. Canada’s national cultural dialogue and political discussion will take on a liveliness and depth that will strengthen national, regional and local communities.

The list of possibilities is long, and the promise is real — provided that everyone can respond wisely and quickly to the new realities. The social, economic and cultural transformation to be faced is fundamental. And if its promise is dramatic, so too are the challenges it creates. Some must be met at the international level through governments working cooperatively. Others must be confronted here at home through people joining together.

THE GLOBAL CHALLENGE

With technologies that increasingly destroy distance, the challenge of seizing the opportunities of the new age is not merely national, but global in nature. The new technologies are truly creating an arena independent of jurisdictions and boundaries. With this new reality comes an ever more pressing need to align national strategies with the worldwide movement toward a global information society.

The increasing attention to the global information society within international organizations such as the Group of Seven (G-7), the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) reflects countries' growing awareness that issues in the digital world possess transnational implications. The Council strongly supports Canada's leadership role in G-7 pilot projects, the economic policy work of the OECD and other fora. We encourage continued active involvement.

Canada, in keeping with its national traditions, should also continue its work to involve the developing world as a full participant in the global information society through fora such as the May 1996 Information Society and Development Conference in South Africa and the Knowledge for Development in the Information Age Conference in Toronto in June 1997. The Council advises the federal government, particularly Canadian development agencies such as the Canadian International Development Agency and the International Development Research Centre, to continue placing high priority on helping to strengthen the information infrastructures of developing countries.

Canada must also not forget its own interests in this new global arena.

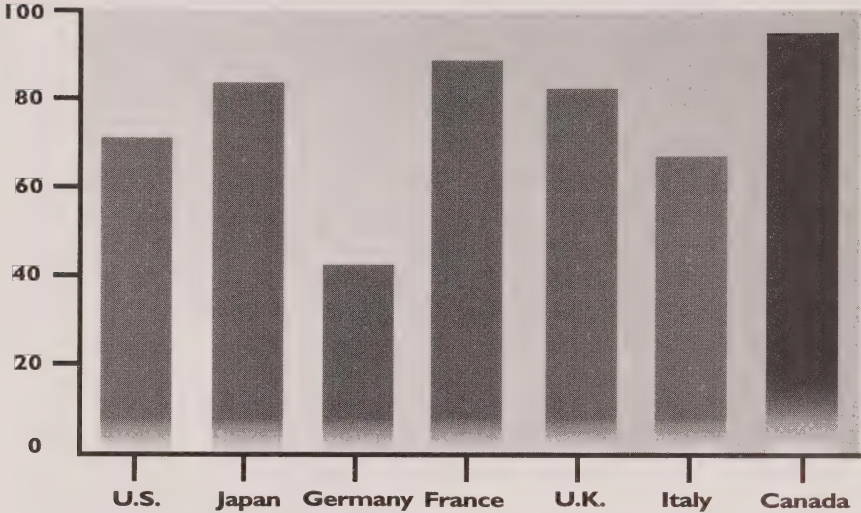
Communications infrastructures carrying information-based services will gain in importance at the expense of transportation infrastructures. In a global economy based on exploiting information, the capacity to innovate will be an essential source of comparative advantage. Prosperity will depend on a country's ability to apply technology creatively in devising new and consumer-valued information products and services.

Canada must keep abreast with, if not ahead of, its major trading partners in efforts to create this new kind of economy and society. Part of our second phase of work has been to assess initiatives to create wealth and jobs in a knowledge-based economy. We also asked how effectively Canada, as a knowledge society, has employed technology to meet its social and cultural goals. In both cases, our assessment benchmarks Canada's progress against other nations' achievements (Figure 1-1).

The Council reviewed data collected from many sources to compare Canada's progress with other countries (see Annex B). A range of social and economic criteria are used to measure development of the information infrastructure, defined broadly to capture basic indicators of the knowledge economy and society. By this standard, Canada is a world leader on the Information Highway — a result confirmed by

Figure 1-1
Fixed Network Digitization, 1994

Digital main lines (%)



Source: International Telecommunication Union, *World Telecommunication Development Report* (Geneva: ITU, 1996).

two major cross-national studies performed independently by recognized international consulting firms (see IDC/World Times, *Information Imperative Index: Toward the Third Revolution*, 1996; and Spectrum Strategy Consultants, *Development of the Information Society: An International Analysis*, Norwich, U.K., United Kingdom Department of Trade and Industry, 1996).

The research also demonstrates, however, that our major trading partners are challenging Canada's long-standing leadership in communications. In areas such as investment in network modernization and research, Canada could soon be overtaken without renewed efforts to maintain our international position. The data also suggest that some countries are more aggressive in exploiting the social and cultural advantages of the Information Highway.

In *Connection Community Content*, the Council sounded a note of urgency about the need for action to drive Canada forward on the Information Highway. While this report acknowledges the many significant achievements recorded by government and the private sector, we believe the

need for rapid action persists. The importance of maintaining the momentum created by the first Council report and by the federal government's action plan for the Information Highway, *Building the Information Society: Moving Canada into the 21st Century*, is a recurrent theme throughout this report.

Information and its manipulation through communications networks and computers is becoming a key strategic resource that determines the competitiveness of firms and nations. Countries that succeed in this environment will require very different strengths from those needed only a few short years ago.

Measuring the comparative success of countries in making this transition is still in its early stages. Despite the clear indications of Canada's pre-eminence in information technology so far, cross-national comparisons in this area are an undeveloped science. Because many of the performance indicators now used are quite crude, it is too soon to say for certain how secure Canada's international ranking in this field is. Nor is it reassuring that many observers point to serious deficiencies in our ability to track exactly what is happening during this transition from an industrial to a knowledge-based economy.

Reliable performance indicators are critical both as a means of gauging Canada's progress and as an indispensable tool for effective economic policy. Both the federal government and industry must equip themselves with some means of assessing Canada's progress toward a knowledge-based economy and our competitive success in the global knowledge economy.

1.1 Industry Canada and other federal departments should work closely with Statistics Canada and within international organizations such as the OECD to continue and complete their efforts to develop reliable measurement instruments appropriate to a knowledge-based economy. This could take the form of a system of "accounts" for the Information Highway, based on key economic and social indicators relating to infrastructure investment, employment and technology diffusion.

Such indicators data should also measure the degree of access Canadians have to the Information Highway, as well as provide information on the availability and consumption of Canadian content. Chapters 4 and 5 deal with the access and content issues, respectively. Data should also be collected relevant to the employment and lifelong learning issues discussed in Chapters 6 and 7. Recommendations 4.4, 5.4 and 7.8 specifically address these information needs.

A NATIONAL EFFORT

The Advisory Council remains convinced that the issues surrounding development of the Information Highway are so far-reaching that neither government nor industry nor individual Canadians can hope to tackle them alone. Since the release of our earlier report, *Connection Community Content*, we have been delighted by the energetic response of industry, individuals and community groups across the country to the imperative of developing Canada's Information Highway and using it effectively to meet Canadian needs.

Governments also have met this challenge with a spirit of commitment and cooperation. Because no single tier of government can hope to meet this challenge alone, our first report contained no fewer than 40 recommendations calling for cooperation, coordination and joint action by federal, provincial and territorial governments. In response, building the Information Highway has become the agenda of governments across the country. In the past three years, Newfoundland, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan and British Columbia have created Information Highway advisory groups. Several provinces are now discussing partnerships with the federal government to promote access to the Information Highway or to collaborate on pilot projects to deliver government services electronically to the public.

The Council welcomes particularly the meeting in September 1996 of federal, provincial and territorial ministers responsible for the Information Highway. All provinces and territories took part, and ministers agreed to work toward a common approach in areas of importance to Canadians such as promoting access to the Information Highway, expediting the joint electronic delivery of government services and developing a "critical mass of French-language products and services" for the Internet and other new media. The ministers are expected to consider specific proposals to address these and other issues when they meet later in 1997. The Council strongly supports concerted action of this kind and encourages ministers to cooperate in pressing forward measures that address the many matters of common concern to all Canadian governments.

THE WORK AHEAD

The Council also intends to do its part in helping strengthen the momentum of these efforts to ensure Canada's successful transition to a knowledge society and economy. Our vehicle will be this report, which offers advice on major areas of "unfinished business" that remain for governments, the private sector and individuals.

This report also reflects a shift in emphasis from our September 1995 report, *Connection Community Content*. While we tended earlier to treat the economic, social and cultural dimensions of this transition separately, we are now struck by their seamless interdependence. In the 21st century, a healthy society and a vital culture will be critical to a vigorous economy by providing the skilled people, inspiration and community cohesiveness that provides a nurturing framework for economic activity, jobs and wealth. Conversely, unless the economy flourishes and unless wealth and jobs are created, our society will fray and our culture will languish. The challenge, as always, lies in achieving a harmony among these elements of success.

Our first report focussed in large degree on the technology and the information infrastructure that will be the central nervous system of the new economy and society. Here we place at least equal priority on the measures needed to ensure that Canadians can use these new technologies to meet their individual and collective goals — whether these be economic, social or cultural. We have always recognized that technology is not an end in itself, but only a means to realize traditional Canadian goals and values.

The continued rapid development of the information infrastructure nevertheless remains urgent. **Chapter 2** addresses the key economic and technological issues related to building this infrastructure for the new economy. In the past three years, the Internet has emerged as a key component of that infrastructure and a model for what the Information Highway may become. **Chapter 3** focusses on the Internet's new importance and examines what governments and the private sector should do to ensure that its potential commercial, social and cultural benefits are fully realized by all Canadians.

If Canadians are to receive those benefits, they obviously must have access to the Internet and this evolving information infrastructure. **Chapter 4** examines the measures needed to ensure that Canadians retain access to basic telecommunications and broadcasting services, promote access to Information Highway services such as the Internet, and define universal access in a knowledge society. Resolution of these access issues is a critical precondition for Canada's future as a knowledge society and its success as a knowledge economy.

This new level of use should ensure access to ever more Canadian content. But in a global competitive environment, this may be easier said than done. **Chapter 5** looks at ways to ensure that the Information Highway makes room for Canada's cultural distinctiveness and linguistic duality. To this end, we examine the best means of supporting the

production, distribution and promotion of Canadian content products and services in a global competitive environment, both as a source of jobs and way to strengthen our national, regional and local communities.

As well as providing a favourable environment for Canadian content, the new infrastructure and technologies must help the Canadian economy to flourish. **Chapter 6** examines how to ensure that the Information Highway contributes fully to job creation and economic growth. To this end, we look less at technology than its economic impacts — particularly on employment and specific sectors — and the measures needed to ensure that Canadians can take full economic advantage of the technology. A key requirement here is a solid foundation for electronic commerce and an environment for creating the new content and information services that will be the lifeblood of the knowledge economy.

The present technological revolution is affecting both the nature of employment and the workplace. **Chapter 7** focusses on these issues and the need to modernize labour standards. It also looks at how the new technology is creating opportunities for lifelong learning that will be critical both to workers and industry, given that skills will need to be constantly updated in a knowledge economy.

Chapter 8 examines how government must move quickly and aggressively to become a model user of information technology — and not simply as a matter of effectiveness and efficiency. What is at stake here is the continued relevance and legitimacy of government in a fast-moving knowledge society and economy.

Chapter 9 summarizes the Council's major conclusions after three years of examining Canada's strategy for the Information Highway. It also highlights critical future priorities for Canada's Information Highway and explores the need for an ongoing focus on Information Highway developments.

Chapter 2

BUILDING CANADA'S INFORMATION INFRASTRUCTURE

Just as roads, railroads and airports formed the infrastructure for the industrial society, so communications, computers and a range of other new technologies will constitute the infrastructure for the 21st century's knowledge society and economy. The gulf between the two kinds of infrastructure is as profound as the difference between the two kinds of society. The transportation infrastructure of the industrial society carried people and goods from one place to another; the knowledge society's infrastructure will carry the less-tangible products of the digital age — information, knowledge and intelligence.

As nations around the world, including our major trading partners, move rapidly to transform themselves into knowledge societies, Canada can do no less. Indeed, as the 21st century dawns, keeping abreast will determine Canadians' success — individually and collectively — in achieving their social, economic and cultural goals. The foundation for this transition will be the development of infrastructure — or “infostructure” — for this new kind of society. In *Connection Community Content*, we attached high priority to this challenge.

Defining what exactly constitutes the infrastructure or “superstructure” of a knowledge society is still a subject of continuing debate. Here we emphasize communications infrastructure broadly defined as the networks, systems and other hardware and software of telecommunications, broadcasting and computer communications, which are the three key technologies now converging to form the Information Highway.

Though we focus now on communications infrastructure, the other main elements of the Information Highway addressed later — access, content, human resources, to mention only a few — are equally strategic to building a knowledge society. All are important, and we believe success in the digital world will depend not only on how well and quickly the physical facilities are built, but also on how effectively this hardware for social, economic and cultural development is exploited.

COMPETITION, CONVERGENCE AND INNOVATION

The Council gives paramount importance to creating an environment favourable to private sector investment in infrastructure and innovation. In *Connection Community Content*, our first theme was that “fair and sustainable competition should be the driving force behind the Information Highway; regulation should ensure an open market, a strong Canadian presence and a fair game.” IHAC’s first recommendation called on the federal government to “recognize the urgent need to deal with the regulatory framework and initiate action to remove barriers and implement safeguards, thereby ensuring the right environment for competitive development.” This emphasis upon a competitive environment grew out of our belief that: “With the right regulatory framework and environment, the timing and financing of the infrastructure will be determined by market conditions, and companies will make the necessary investments and bear the financial risks.”

The Council’s challenge to the government was to create that competitive environment and, to this end, made some 35 recommendations.

Canada’s Progress

In response, the government has recorded significant achievement. Uniquely important was the government’s release in August 1996 of its policy statement on the convergence of broadcasting and telecommunications. It provides the framework for fair competition between cable and telephone companies in their respective core businesses. To level the playing field for such competition, the government also issued new rules for domestic ownership of broadcasters more in line with those

for telecommunications. The *Bell Canada Act* has also been amended to allow the carrier into broadcasting. These steps will encourage convergence and effective competition across the entire realm of communications and information technology.

The government has also used its policy making, licensing and regulatory power under the *Radiocommunication Act* to facilitate competition and encourage the introduction of new technologies and services. Industry Canada in the past two years has issued policies and licences for Personal Communications Services (PCS) and Local Multipoint Communications Systems (LMCS). The latter is especially significant for convergence. LMCS involves wireless broadband systems capable of carrying telecommunications and broadcast distribution services in competition with telephone and cable companies.

In November 1996, the Minister of Industry issued a call for applications to develop and operate direct broadcast satellite facilities capable of delivering broadcast services to low-cost home satellite dishes in competition with cable television. The complex issue has been the focus of several government and regulatory measures designed to establish a Canadian-based service.

An industry-government task force was also established to advise on Canada's transition to digital television, which provides clearer, higher-resolution pictures and a new capability to distribute data and value-added services. Even closer to general deployment is digital radio broadcasting. A spectrum allocation plan was issued in June 1996, followed this year by proposals for a spectrum policy to permit use of digital radio for non-broadcasting services. The CRTC issued transitional licences for digital radio services in 1996.

In *Connection Community Content*, the Council urged the CRTC to follow the 18-month schedule laid out in its own May 1995 convergence report for moving toward competition between telephone and cable companies. In the past 24 months, the Commission has accomplished an impressive amount of work (see Annex C) and has put in place most of the major building blocks for a regulatory framework that will allow competition, convergence and the introduction of new services. For example, Telecom Decision 94-19 established a broad regulatory framework for telecommunications and addressed convergence, competition, price caps, the scope of inter-exchange contributions, deregulation and forbearance from regulation, rate rebalancing, convergence and the safeguards needed to ensure fair competition. The CRTC has been working since then on follow-up proceedings to implement its decision.

This move to competition means that over time the CRTC will be regulating less. All of these proceedings touch on this reality. In 1996, the Commission issued a policy on exemptions, indicating it would be predisposed to exempt those undertakings whose impact on the broadcasting system and potential contribution to achieving the policy objectives of the Act are clearly minimal and would not be enhanced by licensing and regulation. In March 1997, the CRTC released a policy framework for competition in broadcast distribution services. A proceeding is also now under way on applications by telephone companies to offer cable television services — including video on demand — on an experimental basis in three provinces.

Most important of all, on May 1, 1997, the CRTC released key decisions setting the rules for local telephone competition, implementing price cap regulation for non-competitive markets, broadening the scope of services paying inter-exchange contributions, and determining responsibility for recovery of costs for local number portability (that is, the mechanisms required to ensure a customer can keep the same telephone number when switching to another carrier).

On the same day, the Commission announced that in 1998 “all the milestones will be in place leading to true competition and convergence in the telecommunications and broadcasting distribution industries.” Effective May 1, 1997, cable companies are able to enter the local telephone market. Effective June 16, 1997, telephone companies are able to apply for broadcasting licences to enter the broadcast distribution market as early as January 1, 1998.

The range and number of initiatives are impressive. The Council strongly supports the many government and CRTC initiatives, taken domestically and in the international arena, to encourage fair and sustainable competition. These have established in Canada one of the world's most progressive, competition-based policy and regulatory regimes for the Information Highway.

The Principle of Technology-neutrality

In an environment of converging technologies and markets across the communications and information sector, it is a matter of utmost urgency that the policy agenda continue to move forward. Neither the government nor the CRTC can waver in completing those elements of the policy and regulatory framework necessary for fair and sustainable competition.

The CRTC still has much to do in moving to a less-regulated environment that will allow fair competition among converging technologies — working out precise definitions of services and licensing requirements

in broadcasting, as well as developing and implementing rules for competitive entry into the local telephone market. The government must clarify the definition of broadcasting and develop by the end of 1997 a national access strategy to clarify service providers' obligations with respect to universal service.

Despite work to date, there is a continuing need for government and the CRTC to adapt their policy and regulatory regimes to the rapid pace of technological change. In an age of headlong technological transformation, it is critical that market forces determine what technology is appropriate for the provision of a particular service. Only in this way can Canadians receive full benefits from the convergence among technologies and industries now occurring in the economy. To this end, the policy and regulatory regime must be "technology-neutral" — not favouring one technology — as emphasized in *Connection Community Content*.

2.1 To accommodate the increasing convergence of industries and technologies occurring in the modern economy, the federal government must:

- a. assume its responsibility to complete those elements of the regulatory framework necessary for fair, sustainable competition;*
- b. continue to move toward "technology neutrality" in its policies and regulations affecting the Information Highway; and*
- c. ensure that policies fully support the integration of technologies to implement solutions and applications at the sector level, such as in health care, education and financial services.*

GLOBAL CHALLENGES AND OPPORTUNITIES

Despite the rapid advances in policy and regulation for the Information Highway, our sense of urgency remains.

As countries around the world have begun to appreciate the Information Highway's central role in the economy, they have attached ever higher priority to investment in information infrastructure at all levels and in all sectors. Cross-national studies (see, for example, Spectrum Strategy Consultants, *Development of the Information Society: An International Analysis*, Norwich, U.K., United Kingdom Department of Trade and Industry, 1996) measuring network modernization, service development, technology diffusion and growth in demand show Canada's historic leadership position in communications being challenged by

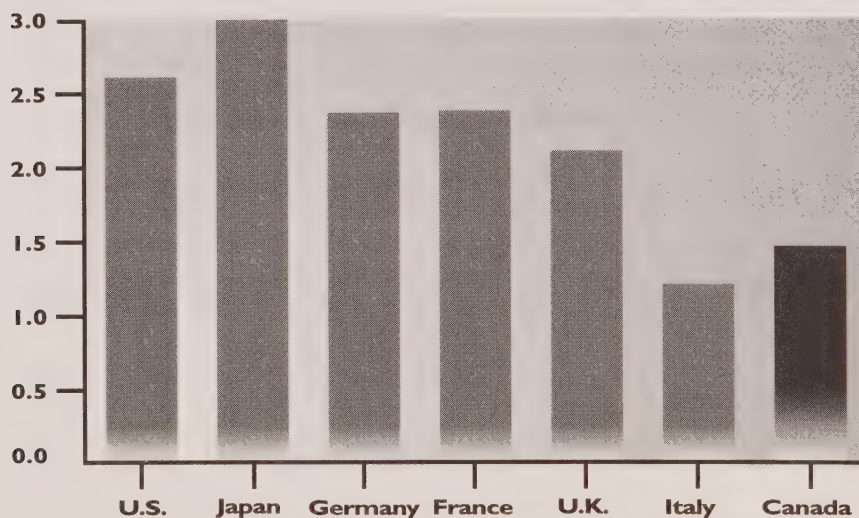
its major trading partners in North America, Europe and Asia.¹ As shown in Annex B, Canada ranks high or very high among our major trading partners with respect to:

- spending on information and communications technology
- the competitiveness of our information and communications sector
- the degree of competition and liberalization in our communications policy and regulatory environment
- the modernization of our communications system
- the pricing of communications services
- overall penetration of new technologies
- high educational attainments.

Yet closer examination of these key indicators shows some of our major trading partners drawing even or even pulling ahead of Canada in performance. As Figure 2-1 shows, Canada's overall expenditures on R&D — an indicator of the innovation so vital to a knowledge

Figure 2-1
Spending on Research and Development, 1993

Percentage of GDP



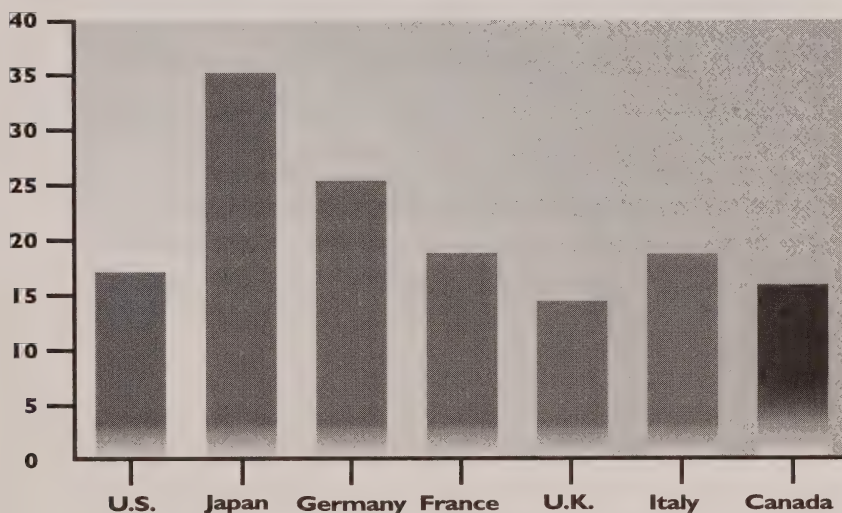
Source: Data provided by the World Economic Forum, 1996.

¹ See, for example, Spectrum Strategy Consultants, *Development of the Information Society: An International Analysis* (1996).

economy — represent a smaller portion of gross domestic product (GDP) than in many industrialized countries. In addition, Figure 2-2 illustrates that Canada ranks only in the middle of the pack with respect to *per capita* capital investment in information and communications technology. This uncertainty regarding our future position in these areas intensifies the sense of urgency surrounding the need to maintain and strengthen Canada's information infrastructure.

Figure 2-2
Public Telecommunications Investment,
1995

Percentage of revenue



Source: Data provided by the Organisation for Economic Co-operation and Development.

The Information Highway has become the major enabling infrastructure for the knowledge-based economy. The future competitiveness of Canadian industry at home and overseas will increasingly depend on the availability of high-quality information networks in all parts of Canada. Investments in network modernization, research and development, and technology deployment throughout the Canadian economy are therefore essential if Canadians are to prosper in the global marketplace.

As outlined in *Connection Community Content*, we believe the private sector must take the lead in constructing the Information Highway. While government has the responsibility to ensure an attractive policy and regulatory environment for investment, industry must take full advantage of the investment opportunities that are emerging as Canada moves toward a fully competitive market environment.

- 2.2 *Government and the private sector must commit themselves fully to building the high-quality, affordable information infrastructure needed to maintain and strengthen Canada's position in the global information economy.***
- 2.3 *Investments in network modernization, research and development, and technology deployment throughout the economy must become a priority for private and public sector alike.***

The Agreement on Basic Telecommunications Services under the international General Agreement on Trade in Services (GATS) was concluded in February 1997. This new arrangement magnifies the challenges and opportunities facing Canada's and the world's communications industry. In developing the Canadian position for the negotiations, the federal government consulted extensively with Canadian companies. The Council fully supports the manner in which the views of the private sector were sought by the federal government and are reflected in the Canadian position tabled in Geneva at the GATS negotiations on telecommunications.

Under the new agreement, 69 countries will move to open their markets for telecommunications services to greater competition from outside. Taken together, these countries represent about 95 percent of world telecommunications revenues, and many of them constitute important export markets for Canada. We believe the GATS agreement on telecommunications provides a sound foundation for building the global information infrastructure that will benefit all countries, including Canada.

Canada also has committed itself to completing in phases the liberalization of its domestic and international markets for telecommunications services. Specifically, Canada has agreed to end the monopoly of Teleglobe Canada for international telecommunications as well as that of Telesat Canada for satellite systems. Under the agreement, however, Canada can retain its rules permitting foreign investment in domestic facilities-based telecommunications services suppliers only up to a level of 46.7 percent. We register our support for the settlement Canada has achieved on the issue of ownership of facilities-based carriers. Domestic

ownership of telecommunications facilities is critical to ensuring that investments in the information infrastructure reflect the interests and priorities of Canadians.

- 2.4** *The requirement of Canadian ownership and control of communications infrastructure, which has been the foundation for Canada's telecommunications and broadcasting policies for many years, should remain a central feature of Canada's strategy for development of the Information Highway.*

ENCOURAGING RESEARCH AND DEVELOPMENT

Over time, the quality of Canada's information infrastructure will depend on our collective capacity for innovation. Our September 1995 report made 35 recommendations aimed at strengthening Canada's research and development (R&D) capabilities. But one overriding consideration remains.

- 2.5** *An environment for sustainable competition must remain as the fundamental requirement for aggressive private sector investment in research and development.*

The period since *Connection Community Content* was released has witnessed the continuing phenomenal growth in computer networking, fuelled by the Internet and the World Wide Web. As Internet use has exploded, it has evolved from an avenue for mainly text-based communications to one carrying ever more graphics, sound and video. The combination of exponentially increasing use and a growing appetite for bandwidth has resulted in slowdowns, brownouts and even the occasional crash of Internet services. Some observers even believe this rapid growth in Internet use could undermine the integrity of the telephone system, a major carrier of Internet traffic. This situation underscores the growing need to concentrate research resources on advanced networking and broadband technologies.

Canadian telephone and cable companies have been at the forefront of development efforts to resolve these problems, with technologies such as Asymmetric Digital Subscriber Lines (ADSL), cable modems and integrated service digital networks (ISDN). Future efforts should build on Canadian strengths to create advanced, high-capacity, fully interoperable networks of networks. Direct and indirect measures by government to support R&D by Canadian companies should give priority to research on improving the capacity, interconnection and interoperability of high-speed networks and related applications.

- 2.6** *In supporting science and technology, the federal government should attach priority to Information Highway research aimed at enhancing the capacity, interconnection and interoperability of high-speed networks and related applications.*

Collaboration between Private and Public Sectors

Though creating the most favourable environment possible for private sector research and innovation is essential, it is also critical to ensure that public and private research efforts complement and reinforce each other. As the Council suggested in September 1995, vehicles for close collaboration between public and private sectors recoup their cost many times over through the synergies they can create and exploit.

CANARIE (the Canadian Network for the Advancement of Research, Industry and Education) remains one of the primary instruments for cooperation in Information Highway research and innovation. Its high-speed experimental test network connecting universities, companies and research hospitals across the country has stimulated the development of new networking technologies, products, applications, software and services. CANARIE has provided support for Canada's Internet backbone, which through CA*net increased its aggregate capacity by a factor of 100 and provided links to its U.S. counterpart.

These increases in capacity have not kept pace with use, particularly the need for high-capacity links for research and educational purposes. Both are critically important to a knowledge-based economy and will be strengthened considerably when a research and educational network is established. CANARIE should carry out such an initiative in addition to its other advanced networking and applications projects, as we emphasized in our proposal for a program to strengthen Canada's information infrastructure (see *Infrastructure for the Future: Proposals for an Information Infrastructure Program*, Ottawa, Information Highway Advisory Council, December 1996).

- 2.7** *The federal government should join with the private sector to support innovation in advanced networking for the Internet through increased, longer-term investment in CANARIE and other initiatives.*
(See also Rec. 3.2)

Private and public sector research labs must have the appropriate wiring in place if they are to use CA*net II, the Internet or some other network to exchange and share information. We consider the wiring of universities, public laboratories and private research establishments to be essential to the optimal use of the country's science and research resources. Thus, the Council supports the investments in Canada's infrastructure for science

and technology, announced in the February 1997 Budget as one of the responsibilities of the new Canada Foundation for Innovation. We believe a significant portion of the Foundation's \$800 million in funding over five years should go to supporting development of advanced networking capabilities for use by Canadian researchers.

2.8 *The federal government, in its support for innovation in the Canadian economy, should attach priority to investments in advanced networking for research institutions.* (See Rec. 3.3)

Government Laboratories

In *Connection Community Content*, the Council strongly supported a continuing role for government laboratories in Information Highway R&D. We advised that these public sector research efforts be closely coordinated with and complementary to those of the private sector.

In *Building the Information Society: Moving Canada into the 21st Century*, the government indicated that its March 1996 Science and Technology Strategy is ensuring that government laboratories work in close partnership with industry. Government laboratories have often served as brokers among interested players to form R&D consortia at pre-competitive stages of research. The National Research Council exemplified this important role in forming the Solid-State Optoelectronics Consortium, which involved the Communications Research Centre (CRC), Nortel, TRLabs and several other organizations. This initiative has resulted in the deployment of Canadian photonics technologies in experimental broadband network applications.

In response to a specific Council recommendation, Industry Canada's CRC — whose major focus is R&D on advanced wireless communications services — assembled the heads of major communications and information technology research institutions to investigate areas and models for collaboration with their institutions, industry and universities.

In addition to its traditional emphasis on advanced wireless communications, the CRC has begun to intensify its involvement in broadband — particularly the interoperability and interconnectivity of wired and wireless services. The Centre's Broadband Applications and Demonstration Laboratory (BADLAB) now serves as a high-activity hub for CANARIE's National Test Network, Ottawa Carleton's OCRInet, the Government Fibre Network Service, various international testbeds and the extension of broadband communications experiments to remote regions, using satellite communications. The BADLAB will also be used as a major platform to demonstrate technologies that will increase the

capacity, efficiency and accessibility of the Internet and other wireless networks. We support the increasing emphasis on broadband networking at the Centre.

2.9 *The Communications Research Centre in the context of its strategic planning should prioritize its research efforts and resources around those areas of critical importance to securing the competitive position of Canada's high technology sector. These are:*

- a. emerging wireless broadband services such as LMCS and digital radio broadcasting;***
- b. delivery of multimedia services to remote regions by satellite;***
- c. applications of photonics to increase network capacity and versatility;***
- d. components and subsystems for wireless broadband hardware; and***
- e. demonstrations of applications with national and international partners.***

The Council also believes the government should more effectively exploit the CRC's skill and expertise when acquiring and deploying information technology for its own use.

2.10 *The skills and expertise of the Communications Research Centre should be made available to advise the government with respect to its acquisition and implementation of information technology.*

Strategic Investments

Though the private sector has the primary role in building Canada's information infrastructure, government can play a catalytic role through strategic investments that enable public institutions to take advantage of the Information Highway.

During discussions in late 1996 on a second phase of the Canada Infrastructure Program, we advised the government that future infrastructure programs should target strategic investments on the information infrastructure, particularly in areas where the private sector would be unlikely to generate sufficient investment. The Council outlined a number of specific strategic areas in education, health, research and community development where the building of Canada's information infrastructure could benefit from public sector resources.

As announced in January 1997, the extended Canada Infrastructure Program will receive \$425 million in federal funding. With matching funds from provincial/territorial governments and municipalities, \$1.8 billion is available this fiscal year. Although the program does not focus specifically on the information infrastructure, Information Highway projects are eligible for funding and were emphasized in the program's announcement.

We find especially laudable the significant additional allocations in the February 1997 Budget for strategic investments in information infrastructure:

- \$800 million over five years to the **Canada Foundation for Innovation** to modernize Canada's research infrastructure as a key foundation for success in the knowledge-based economy
- \$50 million over three years to set up a **Canada Health Information System** that will ensure health care providers, planners and individuals across Canada have the right information at the right time
- \$30 million over three years to extend the Community Access Program — an initiative jointly sponsored by federal and provincial/territorial governments in partnership with the private sector — to facilitate creation by the year 2000 of public sites for access to the Internet in the 5 000 Canadian communities with populations between 400 and 50 000.

2.11 *The government should continue considering selective strategic investments in information infrastructure for the public sector as necessary contributions to the overall development of Canada's Information Highway.*

SETTING THE STANDARDS

In *Connection Community Content*, the Council made a number of recommendations for government to work closely with industry in developing open, international standards for the Information Highway. As pointed out in *Building the Information Society: Moving Canada into the 21st Century*, "only open standards, universally adopted within Canada and around the world, will allow Canada's Information Highway to develop into an interconnected and interoperable network of networks, where access to one network means access to all."

2.12 To strengthen Canada's voice and impact on issues of network and device interoperability, the federal government should seek a stronger, more cooperative set of arrangements with Canadian industry to put forward Canadian positions to international standards bodies.

Better arrangements will also help consolidate Canadian views to enable the implementation of open standards within Canada.

In response to our September 1995 recommendations, Industry Canada and the Telecommunications Standards Advisory Council of Canada (TSACC), a government-industry partnership, have undertaken a comprehensive study to develop a "standards road map" for Canada's Information Highway. The road map is almost completed. It identifies and provides the basis for resolving key issues relating to interconnection and interoperability. The study makes concrete recommendations and proposes technical alternatives for frameworks that will identify the network interconnection specifications and standards needed to build Canada's Information Highway.

We applaud this study and agree with its stated objective of using standards to promote open and fair competition, while ensuring they result in no undue distortion of the market or impede innovation.

2.13 To promote the construction of Canada's Information Highway based on the principles of openness and interoperability, the Telecommunications Standards Advisory Council of Canada should continue its work to develop and continuously enhance the standards road map. This work should be considered a basis for deciding the specification of the key points of interconnection and interoperability.

2.14 The standards road map and its subsequent versions should be communicated to all parties involved in the development of Canada's Information Highway.

Chapter 3

THE INTERNET: ADVANCING THE INFORMATION HIGHWAY

Over the past three years, the Internet has begun to pervade the lives of many Canadians. Its enormous scope, adaptability and versatility have created dramatic new opportunities for individuals, for the economy and for Canadian society as a whole. Through the Internet, Canadians have access to new forms of entertainment and information. Increasingly, people are using it for buying and selling goods and services. Ultimately, the technology promises to extend and improve dramatically learning, health and other public services. The Internet has thus become central to the Information Highway's evolution, both in Canada and around the world. Indeed, many regard today's Internet as a model for the Information Highway of the future and as a realization of the vision of the Information Highway articulated by the Advisory Council in its earlier work.

The growth of the Internet has engendered a wide range of public policy issues. In *Connection Community Content*, the Council examined many of these issues, including access, advanced networking, research and digitization, which have significantly influenced the development of the Internet. We also addressed concerns regarding offensive content on the Internet. Given the increasing prominence of the Internet, these and other important economic and social issues have merited and received even greater attention in our work since the publication of our September 1995 report.

THE INTERNET PHENOMENON

The Internet is a phenomenon that has exploded into prominence only in the 1990s. But what is it exactly and where did it come from? How has it evolved in Canada? How many Canadians really are using it and how do they use it? What policy challenges does it pose?

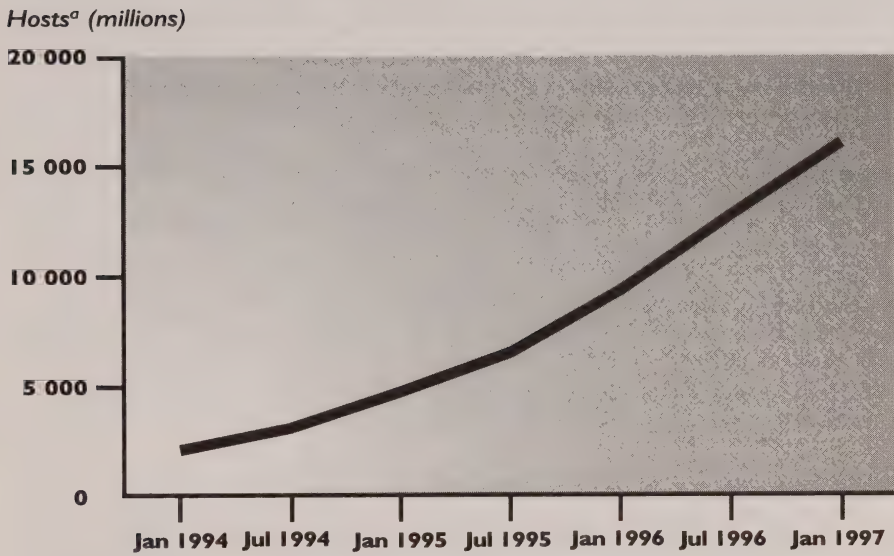
The Nature of the Internet

The Internet is an international network of networks that allows different computer users to share information and communicate interactively. Unlike most other forms of communication, the Internet has no fixed physical location, central control point or permanent intelligence. Instead, all stored information and network management is widely distributed, allowing each remote entity to be in charge of its own area. Each such entity has an equivalent level of authority, priority and control. All work together according to a common set of technical rules and standards.

The Internet's most powerful feature is that it allows computers and networks to communicate openly and effectively, regardless of make, architecture, speed, manufacturer, connection or resources. This is a striking example of open standards — and their beneficial consequences.

Its early developers were committed to establishing open networks that enabled disparate equipment and networks to link and to exchange information. This commitment led to development and use of a set of open standards, or common language, the TCP/IP protocols (Transmission Control Protocol/Internet Protocol). Adapted at an early stage in the evolution of the Internet, the TCP/IP protocols were vital to the expansion of the Internet outside its original military and research community environment (Figure 3-1).

Figure 3-1
Global Internet Growth



^a A host is any computer system connected to the Internet by a direct or dial-up connection. It may provide Internet access to one person or to thousands.

Source: Network Wizards, *Internet Domain Survey*, January 1997
(<http://www.nw.com/>).

The Internet in Canada

The Internet has grown and developed in Canada as a result of a cooperative effort between public and private sectors.

This collaboration began over a decade ago when a number of regional education and research computer networks became operational. As these networks grew, a group of Canada's leading universities and research institutions joined with the federal and several provincial governments to create a national computer communications network. They designed this network to connect regional networks and individual computer systems with one another and with the Internet. The eventual result was CA*net, Canada's national Internet backbone, created in June 1990. The regional networks, as participants CA*net's board, played a direct role in its growth, management and policies. The University of Toronto's Computing Services Department ran the network until April 1996.

Since CA*net's formation, Canada's Internet infrastructure has continued to evolve in response to user needs. CA*net interconnected the regional networks in all ten provinces² by 1990 and linked them to the Internet in the United States with high-speed connections. CA*net's initial speed was 56 kbps (kilobytes per second), but the rapid growth of Internet traffic in the early 1990s necessitated measures to increase its capacity.

In January 1993, the federal government announced CANARIE, a jointly funded government-industry initiative to stimulate industrial R&D on high-bandwidth network facilities and applications. One of CANARIE's first undertakings was the 1994 upgrading of CA*net to T-1 or 1.5 Mbps (megabytes per second) speed. Another in the same year was to connect Canada's north by helping link regional networks in the Northwest and Yukon Territories to the national backbone. In 1995, CANARIE further upgraded the CA*net backbone for satisfactory performance, given the explosive growth in user demand.

Growth and Use of the Internet

Since IHAC began its work more than three years ago, the Internet has become, along with the television and telephone, one of the most commonly used media for social and business communication.

The variety and diversity of content and applications available on the Internet are bewildering and continue to expand dramatically. These can only be captured in part by broad categories such as personal messaging, education, entertainment, research, and electronic commerce. Personal messaging or electronic mail (e-mail) remains the most popular application, but others are growing rapidly — such as searching for information on products and services, downloading software, participating in on-line discussion groups and reading on-line newspapers or magazines.

Business use of the Internet is also climbing. Firms employ it to conduct market research, on-line business, and Electronic Data Interchange (EDI) transactions. The World Wide Web (WWW) has also become a popular advertising vehicle for commercial products and services.

² These first regional networks included NLnet in Newfoundland, NSTN in Nova Scotia, PEInet in Prince Edward Island, NBnet in New Brunswick, RISQ in Quebec, ONet in Ontario, MBnet in Manitoba, Sask#net in Saskatchewan, ARnet in Alberta and BCnet in British Columbia.

Consumer acceptance of the Internet is difficult to determine precisely. Limited statistical information exists on the number of Internet users and the pattern of their usage. Several studies have confirmed the increasing popularity of the Internet and World Wide Web. An A. C. Nielsen survey (*Canadian Internet Survey*, February 1997) taken from October to December 1996 shows that 13.3 percent of Canadian households subscribe to the Internet at home, though many more Canadians use it at work. All indications are that Internet penetration is rising rapidly, but it is difficult to prove because the results of different surveys are not comparable with each other or over time (see IHAC Secretariat, *The Internet: A Snapshot of Cyberspace*, 1997). Statistics Canada surveys do confirm strong growth in the proportions of Canadian households with computers and modems and other indicators of increased use of computer networking³ (Figure 3-2). International comparisons show Canada's Internet penetration is relatively high, though not as high as Finland, the world leader with a penetration rate double that of the U.S.⁴

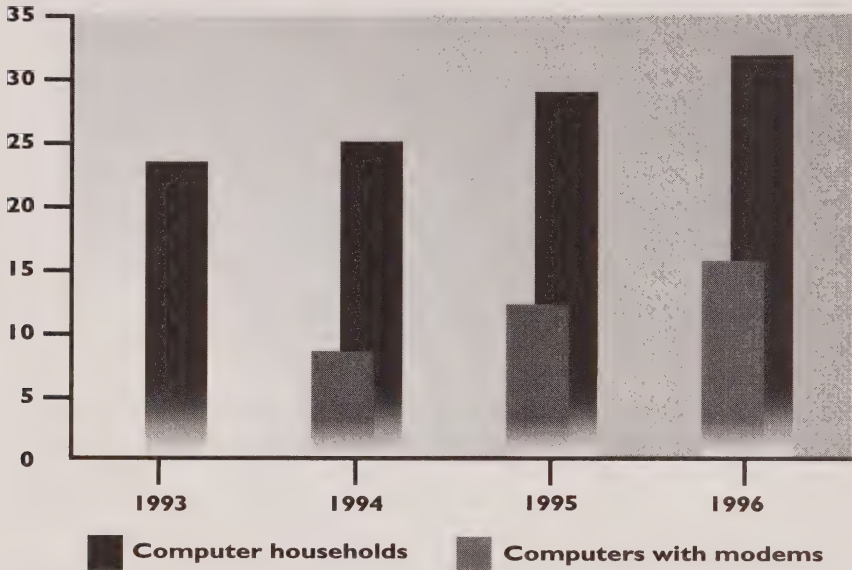
The pricing of Internet services in Canada may partly explain the relatively high level of Internet penetration here. A recent OECD study (*Communications Outlook*, Paris, 1997) reveals that Canada has the lowest cost for Internet access of all OECD member countries. These low costs occur because of the flat monthly rates charged here for local telephone service as well as attractive pricing for Internet service provider (ISP) services. In many other countries, usage determines the size of local telephone bills, and ISP charges tend to be higher too. Relatively inexpensive access to the Internet has both increased the number of Canadians connected and encouraged them to spend more time exploring services available on the network. As a consequence, Canadians are more familiar with the technology, creating increased economic activity as well as new business and services on the Internet.

³ The growing popularity of the Internet has also led to increasing media attention. A recent content analysis of eight newspapers across Canada during one month in 1996 revealed 1 043 articles mentioning the Internet, compared with a total of only 23 articles in the same month in 1993.

⁴ Youssef M. Ibrahim, "As Most Wired Nation, Finland Has Jump on 21st Century," *New York Times* (January 20, 1997).

Figure 3-2
Canadian Household Computer and
Modem Ownership

Percentage of households



Source: Statistics Canada, *Household and Facilities Equipment Survey*,
Catalogue No. 64-202-XPE.

The Internet Challenge

Though growth of the Internet has been rapid, many issues surround its future development and role. These revolve around creating the right conditions to realize its full economic and social benefits. We believe the following policy areas will require careful attention:

- the need to ensure growth, expansion and innovation in the network infrastructure of the Internet
- identification and implementation of measures by governments and the private sector to maximize the Internet's contribution to economic development and job creation
- development of appropriate means for governments to address key social and cultural issues surrounding growth of the Internet.

INTERNET INFRASTRUCTURE

The Internet has begun to stimulate innovation in products and services, responding to a wide range of different niche markets. The network's capabilities for delivering multimedia services mixing text, sound, video, graphics and animation continue to evolve and improve rapidly.

Though these advances have contributed to the Internet's immense popularity, its rapid growth has induced a number of "growing pains." The immense success of the World Wide Web and the greater capacity required to support multimedia applications have combined with bandwidth limitations to make the Internet increasingly subject to congestion and bottlenecks. For example, sometimes it can be agonizingly slow, if not impossible, to access some Web sites at peak hours. These bottlenecks stem from several sources.

One occurs at the level of the regional and national networks forming the Internet backbone and interconnecting ISPs, organizations and individuals to the Internet. These networks or their National Access Points (NAPs) are vulnerable to traffic overload and congestion, especially when transmitting bandwidth-intensive multimedia applications such as video-conferencing. These difficulties, which result in slow response times, errors and delays, have prompted demands for greater bandwidth, higher-speed connections and faster network hardware.

A second bottleneck can occur when a concentration of key Internet resources channels traffic through the same route or to the same Internet location. The popularity of some Web sites can itself create access problems if they lack the necessary network or software capacity to absorb the volume of use associated with thousands of "hits" from their clients. For example, Yahoo and Netscape are the Internet's two most popular sites; their ability to respond can often be severely constrained.

Mirroring,⁵ caching⁶ and similar techniques can mitigate these problems, but raise complex liability and copyright concerns. Another solution may lie in improvements to existing protocols, and the World Wide Web Consortium has redesigned the hypertext transfer

⁵ Mirroring is the practice of replicating or duplicating the most popular Web sites in regional or large urban areas to reduce traffic congestion on the Internet.

⁶ Caching is a feature of Web browsers that allows the user to keep a copy on the hard drive of Web pages previously visited. The next time a site is visited, the page is retrieved from the hard drive rather than from the Internet.

protocol (http) to this end. This standard protocol, which has been the basis of the WWW since 1990, will now enable Web users to speed up their downloading of data by two to eight times the existing rate.

A final bottleneck may arise when users rely on the telephone network for Internet access. Although the Internet infrastructure is largely separate from the public phone system, most home users and small businesses use the telephone system to connect to their Internet supplier. This form of access is effective and cost-efficient, but the rapid growth in volume and the increasing demand for greater bandwidth and higher speed to accommodate new Web-based multimedia applications has placed considerable pressure on network capabilities. For example, a recent study by Bellcore anticipates that phone access to the Internet in the year 2001 will be two to five times greater than today.

The architecture of the telephone network was mainly designed to accommodate standard voice traffic and usage patterns. Those for the Internet are very different, and the dramatic growth in the Internet significantly increases the need to make changes to the network. Partly for this reason, telephone companies are continuing to upgrade their network capacities at an ever faster rate. Adjustments to network architectures can also allow customers, for example, to by-pass the public switched network by rerouting an Internet-related call directly to a service provider. Alternate technologies such as cable television, wireless and satellite networks could also eventually reduce the strain on the public switched telephone network. Peak load pricing of certain Internet-related facilities is a non-technical way of addressing overload and congestion and enhancing Internet connectivity.

Although several ways exist to address the various infrastructure problems, the dynamic nature and complexity of networks means solutions will demand a high level of attention and coordination from government and the private sector. Given the rising use of the Internet — particularly the World Wide Web — and its consequent growth in economic and social importance, it is imperative that action be taken quickly and constantly to adapt the capacity and architecture of the Internet to the needs of the user community. This is especially important for the telecommunications network infrastructure supporting public access.

3.1 *CANARIE and Industry Canada should bring together government and private sector representatives, including telecommunications suppliers, major institutional and business users, and Internet service and software providers, to review the major network architecture issues relating to the Internet and to determine what steps might be needed in the immediate future to respond to problems of network capacity, congestion and bottlenecks.*

The changing network environment and the Internet's rapid commercialization has given birth to the notion of a next-generation Internet network, CA*net II, to support the further development of advanced networking services and applications. Such activity can be in the congested environment of the broader public network. CA*net II will connect authorized sites at universities, other higher education institutions and research organizations. CANARIE has organized CA*net II for implementation by carriers such as Bell Advanced Communications, Teleglobe and AT&T Canada, as well as universities, research organizations and other companies involved in R&D.

The original CA*net will be dissolved in spring 1998, and Bell Canada and the Stentor companies will take on the task of operating the Canadian Internet backbone. This shift in responsibilities reflects the larger continuing change, precipitated by technological advances in the network architecture and policies of the Canadian Internet. Though public investment in advanced networking infrastructure has been critical to the Internet's emergence, we believe the current trend toward greater private sector involvement and an increasingly commercial basis is a positive and necessary step in its evolution.

As more powerful and effective networking technologies appear on the horizon, it will remain important to ensure that the underlying infrastructure for the Internet in Canada stays at the highest technological level. The Council believes, however, the successful partnering of public and private sector initiatives characterizing earlier stages of Internet development will remain a useful model for the future.

3.2 *The federal government should join with the private sector to support innovation in advanced networking for the Internet through increased, longer-term investment in CANARIE and other initiatives.*
(See also Rec. 2.7)

We consider the wiring of universities, public laboratories and private research establishments as a precondition for realizing the full benefits from advanced networks such as the Internet. To this end, we welcome

the increased support for science and technology — particularly the establishment of the Canada Foundation for Innovation — announced in the February 1997 federal Budget.

- 3.3** *The federal government, in its support for innovation, should attach priority to investments in advanced networking for research institutions.* (See also Rec. 2.8)

Developing the technological skills needed for the Internet's successful growth and operation will be critical to its progress in Canada. As we noted in *Connection Community Content*, a highly skilled information technology work force is crucial to Canada's competitiveness and success in building an information economy. Nurturing the skills required to further advanced networking in Canada deserves high priority in our overall effort to create a more highly skilled and versatile labour force for the knowledge economy.

- 3.4** *Industry Canada and Human Resources Development Canada, with the involvement of key stakeholders such as technology associations and educational and training institutions, should:*

- a. determine the availability of required information technology skills in Canada by undertaking further research and analysis as required;*
- b. publish a report on their findings; and*
- c. suggest policy measures as appropriate.* (See also Rec. 6.4 as well as Recs. 5.5, 5.6 and 7.4)

ECONOMIC DEVELOPMENT AND THE INTERNET

The Internet has the potential to bring far-reaching benefits and changes to Canada's economic life and industrial structure. It can generate profound shifts in employment. It can create both global opportunities and a more competitive environment for Canadian companies by changing their market shares, restructuring their operating costs and transforming the way they produce goods and services.

The Internet as a Platform for Electronic Commerce

Electronic commerce involves conducting, managing and executing business transactions using computer and telecommunications networks. It can save time and be relatively inexpensive. It creates opportunities for companies to shorten procurement cycles, cut inventory costs, customize products and expand their market shares. Ultimately, electronic commerce will result in rapid, essentially paperless transactions, sharply reducing both the cost and geographic constraints associated with global trade (see IHAC Secretariat, *The Internet: A Snapshot of Cyberspace*, 1997).

The Internet is relatively inexpensive and has a large market base, making it an attractive platform for commercial activity. For this reason, it has the potential to become a powerful and useful tool for electronic commerce and may well become its driving force, thereby serving to expand significantly worldwide trade.

Until now, the Internet has been used more for traditional advertising and the distribution of information than for commerce and transactions. Many of the commercial transactions now occurring on the Internet tend to represent substitutes for existing retail products and services rather than the creation of new forms of business. Thus, despite the rapid business take-up of the Internet and Web-based services, the Internet has not yet reached full maturity as a platform for commercial activity leading to new markets, goods and services.

The development of higher-value-added transactional services and new information-based products will determine in part the Internet's future contribution to electronic commerce and wealth and employment creation within the economy as a whole. Corel chief executive Michael Cowpland, for example, predicts that business on the Internet will rise from just \$15 billion in 1996 to \$200 billion in the year 2000.

For this promise to be fulfilled, it will be necessary to overcome a number of obstacles that prevent firms and consumers from taking full advantage of the Internet as a platform for electronic commerce. Uncertainty continues to surround questions about security and privacy, consumer protection, authentication and secure modes of payment, telecommunication tariffs and regulation, impeding development of

an electronic marketplace. If electronic commerce is to expand and the Internet is to realize its potential as a venue for economic activity, it is imperative that these concerns be vigorously addressed. If Canada is to be a world leader in electronic commerce, these matters must be addressed as a matter of urgency.

3.5 *Strengthening the emerging role of the Internet as a platform for electronic commerce should be the central economic strategy for promoting the knowledge-based economy. It is imperative that the government reinforce its efforts, both nationally and internationally, in the following areas:*

- a. development and application of open networking standards for interoperability and interconnection;***
- b. clarification of marketplace rules in areas such as privacy, security and consumer protection; and***
- c. removal of the legal, policy and regulatory impediments to the conduct of electronic commerce.***

An uncertain climate for investment in innovative, new products and services could adversely affect growth in Internet markets. The Council considers it important to provide the greatest possible certainty with respect to the regulatory regime governing products and services made available via the Internet. Yet we recognize that the nature of the products and services offered on the Internet has already changed substantially and will continue to evolve. No one can predict with certainty the pattern of Internet use that will finally be established.

Any regulatory approach to the Internet ought to meet the test of technological neutrality proposed in Chapter 2 (see, in particular, Rec. 2.1) to the extent that the Internet in future is used to deliver programming content and services comparable with those carried by broadcasting distribution undertakings. But while the Council advocates a level playing field for competing suppliers, we also recognize the distinctive characteristics of the Internet and the inherent difficulty of enforcing regulations. Although the Council acknowledges the challenge facing the government in addressing this issue, we believe the government can and should indicate its intentions and in particular should clarify its approach to the types of products and services now provided on the Internet.

- 3.6** *The government should clarify its intentions regarding formal regulation of Internet-based services. Currently, the Council questions the effectiveness of any form of licensing of Internet-based services or the imposition of formal content rules or quotas. At the same time, the Council believes the rapid development of information technology has surpassed the present regulatory framework. The government should explore other potential instruments for achieving policy objectives regarding the Internet.*

The need to provide a secure and certain climate for business and consumers applies equally to the domain of taxation. Taxes generally applied across the economy, such as retail sales taxes and business income taxes, should apply equally to Internet-based activities in order to avoid putting competing suppliers in other media at an unfair advantage. Taxes specially directed at Internet services, however, could have a detrimental effect on use of the Internet and discourage investment in new products and services.

- 3.7** *With respect to taxation of the Internet, the government should avoid fiscal measures that may hinder the development of the Internet and its contribution to economic growth.*

Small Businesses and Electronic Commerce

Both the Internet and electronic commerce will revolutionize the way small businesses utilize new technologies to adapt to new markets and commercial opportunities. Because small and medium-sized enterprises (SMEs) represent such a dynamic and growing presence in the Canadian economy, the economic implications will be far-reaching.

The Internet promises a range of economic benefits to SMEs. It can allow lower transaction costs, decreased marketing and communication costs and the opportunity of virtual alliances, global expansion and improved networking. Business-to-business on-line commerce enables small businesses to reduce costs by eliminating the need for purchase orders, accounts receivable and payable, and cheque writing. Networking is crucial to small businesses, and the Internet permits SMEs to expand their networking and business opportunities onto a global stage with minimum capital outlay. According to the Canadian Federation of Independent Business (CFIB), 41 percent of SMEs with 50 or more employees utilize the Internet. This number will grow.

Although SMEs appear eager to jump on the Information Highway and reap the economic benefits of electronic commerce, barriers do exist. For example, consumers have been slow to adopt on-line shopping. Security, signature authentication and merchant and consumer fraud can also pose problems. Obstacles also arise in dealing with credit card transactions and banks. For example, banks currently require businesses to obtain Merchant status. This involves meeting the bank's bond/security deposit requirements, operating through an ISP with a secure site, and obtaining the necessary and costly credit card transaction software. Many SMEs find the upfront costs prohibitive. At the same time, merchants small and large have to assume liability on all credit card transactions.

The private sector itself is providing solutions to some of these problems. For example, insurance policies protecting merchants against the liability risks of business on the Internet are starting to emerge. Transaction brokers have sprung up because of the banks' stringent requirements for Merchant status. This new industry provides a centralized, secure and cost-effective service for on-line commerce. After obtaining Master Merchant status from the bank and meeting all its site security and bond requirements, the broker charges the small business an affordable price to handle all aspects of on-line commercial transactions, as well as technical software and hardware issues. For the consumer, the link to the Master Merchant is invisible and efficient, and consumer interest may be rising. It is anticipated that consumer acceptance of electronic commerce will grow with the introduction and high-profile marketing of the Secure Electronic Transaction (SET)⁷ protocol developed jointly by VISA and MasterCard.

Government can play a vital role in promoting both the Internet and electronic commerce throughout the Canadian economy by positioning itself as a "model user" of information technology. By using the Internet for the delivery of government services and information, the government can encourage and accelerate the diffusion of electronic commerce by and within the business community. As shown in Chapter 8, government initiatives are already assisting Canadian businesses, particularly SMEs, to utilize and embrace the Internet for business and commerce. For example, *Strategis* (<http://strategis.ic.gc.ca>) is an Industry Canada Internet site

⁷ The Secure Electronic Transaction protocol and Master Merchant status are discussed in more detail in the background paper by the IHAC Secretariat and the Canadian Federation of Independent Business, *Small Business and the Information Highway* (Ottawa: Industry Canada, 1997).

that allows Canadian business to access over 20 000 electronic documents containing strategic business information. It also provides a forum for organizations to build domestic and international alliances, identify market niches and discover investment opportunities.

The Student Connection Program places student teachers in small businesses to help them get connected and use the Internet. The Canadian Company Capabilities (CCC) project is a multimedia database on Industry Canada's Internet site. It acts as an international broker and promotional vehicle for Canadian companies to advertise their products and expertise to Internet users around the world.

Helping business to utilize the Internet fully will foster a sophisticated electronic commerce sector in Canada and will help firms expand their business opportunities on the global stage. This in turn will increase the international competitiveness of the Canadian economy and contribute to domestic economic growth and job creation.

- 3.8** *The federal government should expand its use of the Internet for the delivery of government services and information to the Canadian public, to the small business community and to other governments in a manner that accelerates the roll-out of the Internet, widens public access and digital literacy, and enhances consumer value related to Internet use.* (See Rec. 6.7)

SOCIAL AND CULTURAL IMPACT OF THE INTERNET

The Internet's astonishing rise has raised a number of issues related to its social and cultural impacts. Some have expressed concern about the availability of illegal or offensive content on the Internet. Others see it as posing both opportunities and challenges with respect to the distribution of content reflecting the values and aspirations of Canada's local, regional and national communities. Yet others worry that certain groups in Canada have lagged behind in using the Internet, with the result that they may not be able to benefit from the opportunities it presents.

Illegal, Offensive and Inappropriate Content

Many countries, including Canada, have expressed concern that the Internet can carry a considerable amount of illegal, offensive and inappropriate content many deem potentially harmful to individual and community well-being.

Although existing national laws often apply to offensive/illegal material on the Internet, many countries feel there is a need to introduce a new, more formal system of regulation. For example, the European Union is considering the licensing of Internet service providers across Europe or some means of communicating national Internet regulations among governments to provide for monitoring and coordination. The United States Congress passed the *Communications Decency Act*, which has since been deemed unconstitutional by the courts and is now under appeal. In April 1997, Germany introduced "an information and communications services bill" to define clearly the legal framework for multimedia and combat illegal use of the Internet.

As noted earlier, we have reservations about governmental efforts to engage in formal regulation of the Internet at this time, both for reasons of technical practicality and possible industrial impact. The practical difficulties stem from the Internet's international character, which undermines the effectiveness of national regulatory solutions. Because the technology effectively provides a means to by-pass particular suppliers or routings, it transcends national jurisdictions and borders.

For this reason, the Council sees a clear need for the international community to address this concern in a more effective way. We view it as a positive sign that the OECD is now considering practical measures in this area.

The Council also shares the growing concern among Canadians about offensive content, fraud and other illegal activities on the Internet. If the Internet is to develop further as an avenue for conducting business and social intercourse, we believe the rule of law must be applied so as to encourage an orderly arrangement of "cyberspace" for private and public use.

3.9 *Governments should clarify the applicability of federal and provincial laws of general application — for example, the Criminal Code — to activities undertaken via the Internet. Governments should take the necessary steps to ensure their enforcement through appropriate criminal and/or civil remedies.*

Voluntary measures may also represent an effective remedy for certain kinds of problems. In responding to growing concern, the Canadian Association of Internet Providers (CAIP) recently endorsed a seven-step voluntary *Code of Conduct* reflecting its commitment to check potential abuses. Despite the difficulties — both technical and otherwise —

associated with controlling content, CAIP members formally pledged to “not knowingly host illegal content . . . and make every reasonable effort to investigate legitimate complaints about alleged illegal content or network abuse and take appropriate action.”

- 3.10 *The Council supports the development and application of voluntary guidelines to check potential abuses of the Internet, such as the steps recently taken by the Canadian Association of Internet Providers to develop a code of conduct for its membership.***

Strengthening the Canadian Presence

As a global medium for the provision of information, education and entertainment, the Internet has raised a number of public policy issues. These relate to the production and distribution of Canadian content as well as to possible impacts on Canadian cultural values and diversity. We believe the Internet has the potential to make a wide array of content available to Canadians, including content that reflects Canada and the creativity of Canadian creators and producers. Fulfilment of this promise will require supportive measures and policy initiatives such as those described in greater detail in Chapter 5.

- 3.11 *While the Internet currently provides Canadians with a wide range of opportunities to share their cultural values using the Information Highway, governments and the private sector should work together to take maximum advantage of these capabilities as a means of strengthening Canada’s linguistic and cultural reality by ensuring that:***

- a. the appropriate environment and incentives exist to encourage Canadian content providers to maximize their opportunities to employ the Internet for the delivery of content-intensive products and services; and***
- b. the Internet’s protocols, search engines and navigational tools, as well as its governing standards, permit open access and use for all forms of cultural expression. (See also Chapter 5)***

Access

The Internet is an enabling technology with the potential to provide significant social, economic and cultural benefits to Canadians. It also represents an important avenue for citizen participation. For all these reasons, it is in the public interest to accelerate access to the Internet.

Although many Canadians can access the Internet at work or in educational institutions, there are indications that some groups have lagged behind in connecting to the Internet. Programs to accelerate access of the Internet must focus on these groups.

In remote and rural areas, the Internet is increasingly recognized as a key instrument for economic and social development. Yet there is considerable evidence that problems with affordable Internet access will emerge with growing frequency, particularly in more remote regions of the country such as the far North.

Widespread public access to the Internet at the individual, institutional and community level is a precondition for producing a healthy consumer market for commercial products and services and for sustaining the viability of a business environment on the Internet.

- 3.12 The government should focus its access policies regarding the Internet and take the necessary steps to accelerate access in all regions of the country as a means of broadening the market potential for Internet-based services and realizing the social benefits of this technology.***
(See also Chapter 4)

The current and future role of the Internet as an instrument for citizen participation has also been widely discussed and is examined in detail in Chapter 4.

- 3.13 The Council supports the efforts of government and advocacy groups to widen the opportunities for citizen involvement in society through active use of the Internet.*** (See also Chapter 4)

Chapter 4

ACCESS: CORNERSTONE OF THE INFORMATION SOCIETY

Access to the Information Highway is critical to Canada's future as a knowledge society and its success as a knowledge economy. Thus, we emphasized in our first report that "the Information Highway should be at least as accessible, affordable and relevant to Canadians as telephone and television services are today."

As the economy becomes more knowledge-based, Canadians will rely more and more on the potential enabling effects of the Information Highway to succeed economically and remain competitive. Rural and remote areas in particular will experience economic renewal as the Highway overcomes the barriers of distance and difficult terrain. Access to the powerful new learning opportunities provided on the Information Highway will be crucial to the development of the skilled, flexible labour force needed in a modern economy.

At the same time, the Information Highway will become ever more important as an avenue for citizen participation, community development and government services and information in areas such as health and education. Access to new learning opportunities on the Information Highway will help close the gap between information haves and have-nots. Furthermore, from a cultural perspective, access through the Information Highway to Canadian content in both official languages will be critical to strengthening the bonds of local, regional and national community across Canada.

TOWARD A NATIONAL ACCESS STRATEGY

In *Connection Community Content*, we called on the government to develop a national universal access strategy and proposed as its guiding principles:

- universal, affordable and equitable access
- consumer choice and diversity of information
- competency and citizens' participation
- open and interactive networks.

We also made more than 20 other access-related recommendations.

In *Building the Information Society: Moving Canada into the 21st Century* (May 1996), the government committed itself to developing a national access strategy reflecting IHAC's guiding principles. Consistent with the Council's philosophy, the government recognized that market forces would play an important role in putting these principles into action. However, the government also indicated: "Where market forces fail to provide this level of access, the government is prepared to step in to ensure affordable access to essential Information Highway services for all Canadians, regardless of their income or geographic location."

4.1 The government should meet its commitment to articulate a national access strategy before the end of 1997.

As the Information Highway has become more pervasive and significant in the economic, social and cultural life of Canadians, the scope and complexity of access issues have grown. For this reason, an effective strategy for access to the Information Highway must address at least three areas of public policy concern:

- ensuring affordable access to basic telecommunications and broadcasting services, which represent Canadians' "on-ramps" to the Information Highway
- promoting access to new networks and services now appearing on the Information Highway, especially the Internet
- establishing a formal mechanism for defining access and universality in a knowledge society.

We believe the government must set forth clear directions and take appropriate action in these three areas. While much has been accomplished, a great deal of work still needs to be done.

ACCESS TO BASIC NETWORK SERVICES

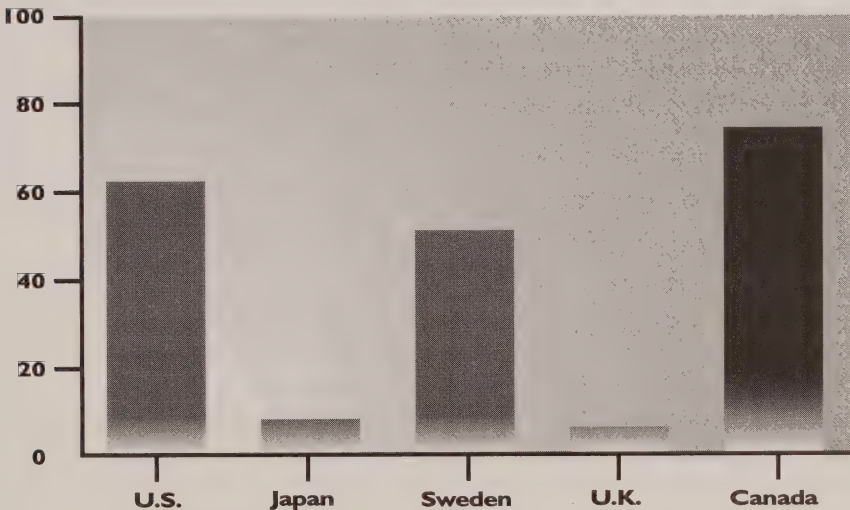
For decades, Canada has led the world in providing access to broadcasting services and basic telecommunications services such as the telephone. These basic services will remain important to Canadians, not only in themselves, but also as platforms for access to the Internet and the new electronic information services that will emerge on the Information Highway. Canada has already achieved universal access to these core networks and services and has safeguards in place to ensure that Canadians retain access to these services in a competitive environment.

Broadcasting

Canada has been one of the world's most successful countries in bringing a wide range of broadcast services to a comparatively small population scattered over a vast geographic expanse. Ninety-nine percent of Canadian homes receive broadcasting signals. Cable-TV is available to about 95 percent of Canadian homes, of which 78 percent subscribe to the service (Figure 4-1). Other new technologies for distributing broadcasting signals are now also becoming available to Canadians.

Figure 4-1
Cable Penetration, 1995

Penetration of total household (%)



Source: Data provided by the TBI Yearbook, 1996, and the TV International Sourcebook, 1996.

The 1991 *Broadcasting Act* declares that the Canadian broadcasting system should safeguard, enrich and strengthen the cultural, political, social and economic fabric of Canada. The system should also be readily adaptable to scientific and technological change, always encouraging the development of Canadian expression that reflects Canadian attitudes, opinions, ideas, values and artistic creativity.

Since the 1970s, an array of regulations has been in place to ensure that a basic package of Canadian and foreign programming services is available via broadcast distribution systems such as cable-TV and satellite. The Accelerated Coverage Plan of the Canadian Broadcasting Corporation (CBC) and a variety of satellite services — most notably Cancom — have brought CBC and many other Canadian and foreign signals to Canadians in remote and rural areas.

To ensure the availability of Canadian content, Canadian broadcasters have had to meet Canadian content requirements. Public institutions such as the CBC, the National Film Board (NFB) and Telefilm Canada, as well as the Canada Television and Cable Production Fund and production funds established by some members of the broadcast and cable sector, have all supported the production of Canadian content. The government also provides specific support to alternative programming through:

- TVNC, an Aboriginal TV service
- TV5, an international French-language TV service
- the Northern Broadcast Access Service.

As well, cable companies until recently have been required to provide community channels for local groups. Some cable companies also choose to set aside a channel for instructional use by educational institutions.

New technologies such as direct-to-home satellites and Local Multipoint Communications Systems (LMCS) have now emerged to provide Canada with additional avenues for the distribution of programming and network services. The Council agrees with the steps that the government and the CRTC have taken to encourage a competitive environment in broadcast distribution. Canadian viewers will benefit with increased choice, affordable rates, better-quality service and improved access to programming services.

Of particular importance was the CRTC release in March 1997 of its policy framework for fair competition in broadcast distribution services, whatever the technology employed. We urge the Commission to meet its deadline of early 1998 for the promulgation of final regulations giving effect to this new policy.

Basic Telecommunications Services

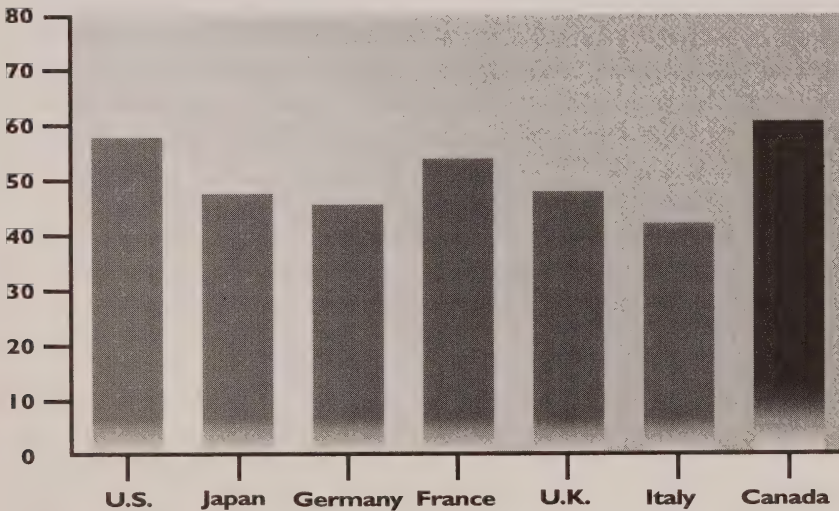
With 98.7 percent of Canadian households connected to the Canadian telephone network, Canada is among the world leaders in providing its citizens access to basic telecommunications networks and services.

Maintaining the affordability of telephone service has been a long-standing priority of communications policy in Canada. It remains at the forefront of the CRTC's regulatory agenda. In 1996, the Commission conducted a proceeding on local service pricing options, intended to examine questions of access and affordability in light of the gradual move toward cost-based pricing of local telephone services. The CRTC concluded that local telephone rates are "currently affordable" to the vast majority of Canadians (Figure 4-2). The Commission also found no conclusive evidence that local rates will not remain affordable in future.

The CRTC did express concern about service to high-cost rural and remote areas, including the extension of service to unserved areas and the upgrading of existing service to underserved areas. The Council agrees with the CRTC that this issue is a matter for concern, and the Commission should address it in subsequent proceedings.

Figure 4-2
Telephone Access Lines, 1994

Number of access lines per 100 population



Source: Data provided by Noracom Consultants Inc., 1996.

Because of a concern that future rate increases might affect affordability of basic services, the CRTC also required a monitoring program to be launched this year. It will provide the Commission with the information it needs to take appropriate action, if and when it becomes necessary. To reveal the extent and nature of affordability problems, the program will involve quarterly reports on penetration and various indicators, supplemented by an annual analysis of affordability based on demographic statistics.

The CRTC is pursuing the correct course in protecting the universality and affordability of basic telecommunications services. In the Council's view, universality and affordability must remain basic tenets of Information Highway policy.

4.2 The CRTC should act quickly on its expressed determination to monitor closely trends in telephone penetration rates and affordability indicators and to intervene when and if the principle of universality is threatened.

We believe neither the CRTC nor the government should tolerate any breach of the principle of universality as it applies to basic telecommunications services.

Two other dimensions of the access issue raised in our 1995 report remain outstanding — party lines and preferential tariffs for health and educational institutions.

Access to the Internet is not possible with party lines. Canadians must have single line — rather than multi-party line — access to the telecommunications network, ideally via digital switches. Most multi-party lines and analog switches can be found in rural and remote areas. We are pleased at the enormous progress on both these fronts. Regulated telephone companies have promised that most, if not all, of their business and residential customers in rural and remote areas will have digital, single line phone service by the year 2000.

In September 1996, the CRTC allowed preferential tariffs on telecommunications services for non-profit educational and health service entities. The new preferential tariffs apply to competitively provided services only and must cover the costs of providing the service — restrictions that may detract from the value of the preferential tariffs to customers. To our knowledge, no such tariffs have yet been offered. The Commission's decision does not respond fully to our earlier recommendations on this subject nor to the expressed needs of educational and health institutions.

ACCESS TO THE INFORMATION HIGHWAY

It now seems possible that the Information Highway may bear some resemblance to an idealized and much extended Internet with expandable communications capacity, interconnection and general interoperability, continuing technological growth and an "open" commercial, legal and regulatory environment. Thus, the Internet is an important element of the Information Highway, and is likely to provide many of the electronic information services to which Canadians will want access.

- 4.3** *The government should emphasize access to the Internet as a first step in ensuring equitable participation in a knowledge society. Any policies assessing access to the Information Highway must address access to the Internet.*

Diffusion of personal computers, modems and the Internet has taken place at a higher rate than many previous electronic hardware and services such as television and VCRs. The penetration of personal computers, modems and the Internet is also rising rapidly.

The evidence indicates, however, that certain groups have been slower to take up these new technologies and services — low-income households, people in rural and remote areas, and others. Further analysis will also be needed to determine how gender, age and other social factors create differences in Internet access and use. Because it is difficult to predict future levels of penetration for these groups, the Council cannot determine with absolute certainty whether there will be an access problem. For example, satellite transmission may prove to be a solution to the problem of cost-effectively serving remote areas.

- 4.4** *The government, particularly through the CRTC, should monitor the way in which the market for Internet access develops, especially for people with low incomes, disabilities or living in geographically remote areas, and should take steps to correct access problems that emerge in such markets. To this end, Statistics Canada should develop measurements of such access and collect and publish statistics to make assessment easier of the nature and extent of any such problems. These statistics could be considered as "key indicators" in assessing Canada's progress toward a knowledge society.*

Effective access to content largely depends on speed of access. Low-speed access will allow access to news groups, information sources and basic services on the World Wide Web (the subset of the Internet that provides graphics-oriented intuitive access to a large variety of database

and other applications). Higher-speed access at correspondingly greater cost is necessary for more efficient Web browsing. Very high bandwidth applications such as real-time video or medical diagnostics will require very high-speed access.

- 4.5** *The government — in cooperation with industry, CANARIE and public interest groups — should monitor the deployment of high-speed access on the Internet, as well as the arrival of more video-based services on the Web, to determine whether access problems emerge.*

Promoting Public Access

The Internet has become a major enabling technology with the potential to provide significant social, economic and cultural benefits to Canadians as well as an important avenue for citizen participation. It is therefore in the public interest for steps to be taken to promote access to the Internet.

Only 13.3 percent of Canadian households use the Internet, according to a Nielsen survey taken October through December 1996, though many Canadians are able to access the Internet at work or in educational institutions. Internet penetration is growing rapidly, with worldwide traffic rates increasing by more than 10 percent a month, according to CyberAtlas, a private research firm. Despite this rapid growth rate, there are indications that people with low incomes and those living in rural and remote areas have lagged behind in connecting to the Internet. Programs to promote access to the Internet should focus on these groups.

In remote and rural areas, the Internet is increasingly recognized as a key instrument for economic and social development. However, Internet access has lagged significantly in rural and more remote regions of the country such as the far North. A major deterrent in remote and rural areas is that, in the absence of an Internet provider within a user's local telephone calling area, it can be impossible to achieve Internet access without incurring long distance telephone charges. Such charges can add significantly to the cost of Internet access.

- 4.6** *The federal government and the CRTC should work with industry to develop ways for Internet access to be made available in all rural and remote parts of Canada without the necessity of long distance telephone charges.*

As with both telecommunications and broadcasting, satellite delivery systems may well represent the only means of bringing the Internet to remote locations such as First Nations communities and those in

the far North. Because a satellite footprint can cover the entire country, market penetration in urban areas might well render satellite distribution of the Internet to remote areas commercially feasible. Telesat Canada's DirecPC now delivers Internet downloads by satellite, though users must communicate with their Internet provider via a land line. Rates range from about \$20 a month for a basic service to \$315 a month for higher-speed packages. These rates include neither the cost of a satellite dish nor the long distance telephone charges that may be incurred if users' Internet access provider is outside their local calling area.

Building the Information Society: Moving Canada into the 21st Century states that Industry Canada's Advanced Satcom Initiative in conjunction with industry will likely provide by the early 2000s a commercial system for satellite-based multimedia services. These would complement terrestrial means, such as optical fibre. An important beneficiary of such a distance-insensitive platform would be community access sites and community institutions in remote locations such as the far North.

4.7 *The government in cooperation with industry should proceed with the Advanced Satcom Initiative, with a view to encouraging — among other applications — the satellite provision of Internet access to schools, libraries and community centres.*

The Council believes the Community Access Program, a program sponsored by the federal and provincial governments with significant support from the private sector, has proven singularly effective in accelerating access by easing the creation of public access points in small rural communities. We applaud the decision in the February 1997 Budget to extend the program to the 5 000 rural and remote Canadian communities with populations between 400 and 50 000.

4.8 *The Council welcomes the extension of the Community Access Program and underscores the importance of the goal of establishing public access sites by the year 2000 in the 5 000 rural and remote Canadian communities with populations between 400 and 50 000.*

By sharing costs with the provinces/territories and local groups, the program provides the tools for local service organizations, community groups, businesses and municipalities to manage and operate the sites. An important strength of the program is that the public sites allow access by people who do not own a computer.

A key question is whether public access sites will be financially sustainable in the long term. While support from governments can cover initial equipment costs, ongoing costs for staff and communications links can impose a heavy burden on community institutions and organizations.

4.9 *The government should provide the resources to install and sustain community access points (CAPs) in public locations to which citizens have easy access.*

Measures such as the Community Access Program provide the least distortion to the Internet marketplace, essentially because they are primarily aimed at people without computers. If anything, they stimulate the market by whetting the public appetite for full Internet access, while at the same time ensuring that all Canadians in rural and remote areas have some Internet access. Distance, other geographic barriers and low population density do not pose the same obstacles to access in urban areas as in rural and remote areas. Yet the majority of low-income Canadians lives in cities and, for this reason, the Community Access Program should not be restricted in future to rural communities. The cost of reaching urban areas need not be exorbitant, particularly if community networks form part of the equation. For example, the National Capital Freenet serves the entire Ottawa–Hull area at a cost of about 30 cents a person a year. Economies of scale come into play in large urban areas.

4.10 *The Community Access Program should receive additional resources to extend community access sites on a sustainable basis to urban neighbourhoods that lack such sites.*

Public Information and Citizen Participation

There are many community networks and freenets in municipalities across Canada, especially in urban areas. These provide non-profit, community-controlled “electronic public spaces” as avenues for citizen participation, community development and government information. IHAC believes that the existence of inclusive electronic public spaces is vital to the democratic health of the emerging knowledge society.

Canadian cable companies have long been expected to make community cable channels available to non-profit groups and institutions in their localities. The Stentor companies have developed the concept of a virtual, Internet-based community channel, which they would offer to subscribers rather than the traditional community channel that cable companies currently provide. Facilities will be provided to help members of the public to create and access information relevant to their communities, using both the Internet and a broadcast channel.

In applying successfully last year for a licence to provide a Local Multipoint Communications System (LMCS) or wireless broadband service in communities across Canada, WIC Spectrum Inc. promised “a public highway, for the benefit of educational, medical and non-profit

community groups in all regions." The company is now negotiating with a steering committee of public interest and consumer groups to implement this vision. These groups are also engaged in negotiations with a number of other providers of communications services. Clearnet Inc., a licensed provider of personal communications services (PCS), will soon provide selected libraries with high-speed links to the Internet and community networks in exchange for access to library rooftops for cell sites. We applaud this cooperative approach and believe it deserves government encouragement.

4.11 Federal, provincial and territorial governments should work closely with industry and public interest and consumer groups to make community networks and public spaces sustainable on the Information Highway.

Federal departments are moving quickly and ambitiously to provide much of the information traditionally available in print over the Internet. The Internet will also be used increasingly to conduct business transactions between the government and the public. The Treasury Board Secretariat has stated that electronic commerce will be the preferred mode for conducting government business by 1998. This move to electronic modes of delivery implicitly shifts distribution costs to the citizen, including the non-profit community networks and freenets that provide significant citizen access to government information and services. In our view, the government should consider ways of compensating community networks for the delivery of government services and information. Indeed, the government should regard such compensation as a normal cost of doing business electronically.

4.12 The government should develop policies and procedures to contribute financially to non-profit community Internet access providers for the electronic provision of government services and information to the general public.

It will also be important for government to recognize, as it moves toward electronic delivery of services, that many Canadians remain without access to either the Internet or community networks. Because government services and information should be universally available, government should continue to provide information in a variety of formats in order to reach all Canadians.

4.13 While moving rapidly toward the electronic provision of information and services, the government should continue to provide such information and services in traditional formats to citizens who do not have access to the Internet or public access sites.

Digital Literacy

Computer and Internet literacy is a necessary precondition for success in the emerging knowledge society and economy. For Canadians able to attend educational institutions, we believe computer and Internet literacy can best be provided by the existing public education system, including continuing adult education as a supplement to commercial training programs.

All levels of government in Canada have been moving actively to ensure our educational institutions can fulfil this role. The February 1997 Budget predicts that, by the year 2000, Industry Canada's Computers for Schools program will have facilitated the donation of 100 000 computers with the necessary software. Already, the program has made 25 000 computers available in Canadian classrooms.

Meanwhile, SchoolNet, a collaborative effort by federal, provincial and territorial governments, the educational community and the private sector, links about half of Canada's 16 500 schools with hundreds of on-line services. Through the First Nations component of SchoolNet, Industry Canada and the Assembly of First Nations will make Internet access available to all 447 Aboriginal schools and communities in Canada by 1998, using high-speed links donated by the private sector. Recently, the sponsors of SchoolNet agreed on a nation-wide plan to help put all Canada's schools on-line by 1998. Meeting these targets is a matter of utmost urgency.

4.14 The Council welcomes the present SchoolNet target of ensuring every school in Canada has full Internet access by 1998. All governments, the educational community and the private sector should work together to meet the goal of ensuring every school in Canada has full Internet access by 1998.

For Canadians without such opportunities — due to low income or remote location — there is a real need to develop high-quality on-line tutorial programs available via public access sites as well as community networks and the Internet.

4.15 Governments should encourage the development of high-quality, on-line tutorial and community-based instruction as a means of providing access to digital literacy training via the Internet, community networks and public access sites.

Publicly funded libraries represent an essential community information resource, with staff experienced in imparting the skills needed to access information in print or electronic form. Public access sites located in

libraries constitute a key instrument in bringing digital literacy to the large numbers of Canadians who do not own a computer and lack Internet access. However, there are obstacles. Most notably, libraries at present face static or declining budgets, even though use of their facilities is increasing.

- 4.16 *Governments should provide resources to every publicly funded library to support sustainable public access sites and learning of basic computer and Internet skills by people who would not otherwise have access to such learning opportunities.***

Access to Canadian Content in English and French

In September 1995, IHAC stated that Canadian content should have a prominent place and “eye-level . . . shelf space” on the Information Highway. Many observers have pointed out that many home pages, browsers and search engines tend to point to foreign content first, with the result that Canadian content can be more difficult to find on the Internet. There are important exceptions to this observation, such as Sympatico, Yahoo Canada and Canoe, all of which allow easy access to Canadian content.

Despite these notable exceptions, we believe the routes to foreign content on the Internet are more numerous than those to domestic content. Regulation, however, does not represent an appropriate response to this situation. We are convinced that much can be accomplished through voluntary action by providers of Internet access.

- 4.17 *All Canadian providers of Internet access should be encouraged to offer on their home pages Canadian reference points for local, regional and national content.***

We recognize that the content and services on the Internet (e.g., the already noticeable public interest in health information) will be a sustaining force for enlarging public interest in universal access.

- 4.18 *The government should resource existing programs, and develop partnership strategies with others, to develop more Canadian content, particularly in new media services.***

As noted in Chapter 5, there is a serious deficiency in the Internet's French-language content. In a September 1996 meeting, federal, provincial and territorial ministers responsible for the Information Highway recognized this situation and identified the development of a critical mass of French-language content as a priority concern. In developing such content, it will be important to involve the many small francophone communities scattered across the country.

- 4.19 *Federal, provincial and territorial governments should work closely with industry and in cooperation with francophone communities across Canada to develop a critical mass of French-language content and services for the Internet.***

Access by Persons with Disabilities

According to the 1991 census, some 4 million Canadians have disabilities. This number will grow as the “baby boomer” generation ages. Without the availability of various alternative methods of access, the Internet can be inaccessible to people with disabilities. At little or no extra cost, hardware and software can be designed to take into account the alternative access needs of people with disabilities.

Such universal design means that systems can easily accommodate assistive devices and allow a range of inexpensive, easy-to-use options. Terminals should have standard interfaces so that assistive devices can be easily attached. For people with hearing disabilities, World Wide Web pages should allow a visual alternative to sound clips. Assistance devices can also take many forms. For example, H. K. EyeCan, a small Ottawa area company has developed VisionKey, an optical card mounted on an eyeglass that lets eye movement operate a computer keyboard. The device permits people with no control over their motor movements to use a computer and the Internet, employing standard software. Though much has been accomplished in the areas of universal design and assistive devices, more needs to be done.

In addition, some people with disabilities may take longer to input information or read screens. Carriage charges based on time disadvantage such people, as they would anyone with a low-speed connection to the Information Highway.

- 4.20 *The government should monitor Internet developments and determine whether steps need to be taken to ensure access will be available, affordable and appropriate to people with disabilities. In particular, the requirements of people with disabilities should be considered at the design stage.***
- 4.21 *As an incentive to the employment of universal design in communications, the government should fund an award program to honour achievements in the design of assistive devices for communications and in the application of the principles of universal design in communications products, systems and services.***

DEFINING ACCESS IN A KNOWLEDGE SOCIETY

If the Internet is truly an important element of the Information Highway and as such is likely to provide most of the basic services to which Canadians should be assured access, then it becomes important to consider a process for determining just what those basic services might be.

Telecommunications policy and regulation have typically addressed the issue of access and universality in terms of simple network access. Broadcasting policy and regulation have usually viewed access in relation to both broadcast signals and programming services. Neither model seems adequate in the new environment. Markets and technologies are now evolving so rapidly and their impacts are so pervasive that new approaches may well be needed to meet critical social, economic and cultural needs.

The fundamental social and economic transformations accompanying Canada's transition from an industrial to a knowledge society underscore the need to focus on access viewpoints beyond those of the federal government and the usual participants in the CRTC regulatory process. This argument becomes even more persuasive when one considers that federal, provincial and territorial governments are turning ever more to the electronic delivery of services. Access to Information Highway services may well become critical to full participation and, indeed, the exercise of democratic citizenship in a knowledge society.

Decisions on what Information Highway services are essential will have far-reaching social, economic and cultural ramifications and should be informed by the viewpoints of industry and the community at large in all its diversity.

An obvious mechanism for developing and bringing forward such multi-faceted advice is an advisory committee or council. Such an approach would be fully consistent with the constitutional and statutory responsibilities of the federal government and the CRTC with respect to communications policy and regulation. A case can be made, however, that the Information Highway has been studied enough and that the government and the CRTC should simply get on with it. On balance, the Council believes the question of access in a knowledge society is so far-reaching that a special effort is required.

- 4.22 The federal government should create a national access advisory committee, reporting to the ministers of Industry and Canadian Heritage, to advise on emerging access requirements and on what services will be essential in a knowledge society. The advisory committee should include balanced representation from industry and the non-profit sector.*

Chapter 5

CANADIAN CONTENT: CREATING AN INFORMATION HIGHWAY FOR CANADIANS

In assessing Canadian content issues, the Council has been guided by its mandate to provide advice that would reinforce Canadian sovereignty and cultural identity. We also recognize the potential for job creation and economic growth in the generation of Canadian content — and the potential loss of employment if the Highway develops in a way that disadvantages Canadians.

Council members understand the challenges Canada faces in making available content reflecting our cultural diversity and linguistic duality. Market forces have never provided fully for Canada's unique needs — not because Canadians are uninterested in their own stories, debates and heritage — but simply because there are not enough Canadians to form a viable market, particularly for higher-cost forms of content. The population of the United States is 12 times larger than our English-language population and more than 30 times that of our francophone population.

Policies to promote Canada's cultural identity have never sought to protect Canadians from exposure to foreign cultural content. What Canada has traditionally sought to preserve — in the context of

exceptionally open access to foreign cultural content — is a measure of control by Canadians over our own cultural markets and our ability to create, produce and make available our own cultural content.

GOVERNMENT COMMITMENTS

In responding to our 1995 report, the government recognized the importance of strengthening Canadian cultural content, stating:

The Information Highway must . . . provide us with a new and more powerful means of enriching and invigorating the ongoing cultural dialogue that defines our national identity, our shared values and the common social purpose that provides the foundation for democratic institutions.

The government recognized the need for a comprehensive strategy on Canadian cultural content. It made specific commitments to identify new ways to facilitate access to capital by Canadian multimedia producers and to implement an export development strategy for Canadian content products. The government has promised to consult provincial and territorial governments to find the most appropriate way to build a rich base of electronic learning materials, with a major emphasis on French-language and Aboriginal content. Action has been promised to encourage collaboration among creators, information industries and research centres to develop new forms of content and production methods and to expand the pool of skilled creators and producers.

As we recommended, the government has created a federal Task Force on Digitization. The Task Force will propose mechanisms to make appropriate federal cultural and scientific collections and information holdings available and accessible to Canadians in digitized form, as well as initiatives to stimulate economic development by digitizing material in these collections. The Task Force is focussing its work on a number of key digitization issues, including access to federal government materials, copyright, standards, selection of materials and funding for digital conversion. By setting up this Task Force, the government has recognized that creating an enabling environment for content producers, distributors and consumers was one of the cornerstones of Canada's Information Highway strategy.

In a climate of fiscal restraint, the temptation may be to focus excessively on digitizing commercially exploitable federal materials, but this might deny Canadians access to collections that their tax dollars have already supported. The Task Force therefore has identified the need to

strike a balance between tax-supported public access to federal collections and information holdings on the one hand and commercialization of value-added information products on the other. In developing plans to digitize federal collections, the government should strike an appropriate balance between providing equitable and universal access to materials of public interest and importance, and facilitating the commercial exploitation of materials in federal collections.

The Council recognizes that the Task Force, by its very mandate, will focus on federal collections and information holdings. We feel the opportunity exists in this process to open a dialogue with stakeholders outside the federal government, for example in the area of standards, and possibly to create a framework for a Canadian digitization strategy. The Council is encouraged that the Task Force has agreed to its proposal to consult with representative groups outside the government in the course of its work. The Task Force on Digitization is expected to present its recommendations to the government by the end of 1997.

Other initiatives to strengthen Canadian content have also been taken. In September 1996, the government announced the Canada Television and Cable Production Fund (CTCPF), which combines \$100 million in new government funding with the resources of Telefilm Canada's Broadcast Program Development Fund and the Cable Production Fund. The new fund was created to help finance truly Canadian dramatic, variety, children's, documentary and performing arts programs. In 1997-98, the government added \$5 million a year to the federal Sound Recording Development Program, primarily to assist the marketing of recordings by Canadian artists. It also supplemented the Book Publishing Industry Development Program budget by \$5 million in 1996-97 and by \$2.3 million in 1997-98. The government also undertook to look at realistic long-term measures to encourage a more stable financing environment for Canadian publishers.

THE NEED FOR AN INTEGRATED PROACTIVE POLICY

The government has demonstrated its intention to reinforce Canadian sovereignty and cultural identity. The situation is now urgent. As stated in *Connection Community Content*, unless and until Canadian consumers are offered diverse, high-quality Canadian alternatives, the deluge of U.S. software, video games and multimedia products into the Canadian market will continue to accelerate. The cultural dialogue among Canadians is already fragile in traditional media.

Canadians want to maintain a distinctive culture. In 1995, an Ekos Research Associates survey found that 72 percent of Canadians thought that national reconciliation could be furthered by strengthening Canadian culture: specifically, by preserving our distinctiveness from the United States and protecting our culture from U.S. influences. Similarly, a December 1996 Angus Reid survey found that 78 percent of Canadians supported government protection of Canada's cultural industries, while 84 percent (93 percent in Quebec) believed the federal government should protect Canada's cultural industries when negotiating trade agreements.

Canada now faces a double challenge.

The emergence of new media creates a need to ensure that cultural policy can encompass new forms of content. This phenomenon also draws attention to the rather patchy nature of existing measures which attribute much greater importance to films and television than to book publishing or recorded music. This first challenge can be met by expanding the scope of Canadian cultural policy to encompass both new media and relatively neglected traditional media.

The second challenge is to bring about this broadening of cultural policy in a constrained financial environment. Such constraints have left some cultural industries comparatively neglected, and leave insufficient money to maintain, much less to expand, cultural support to new media.

Implementation of the recommendations in this chapter will require additional resources. Recognizing fiscal constraints, we have sought to identify ways that existing resources might be better targeted to support content crucial to encouraging a uniquely Canadian culture. While it may be possible to fund partially the proposed measures by reallocating resources, the Council is not in a position to carry out such an assessment. Instead, we suggest in Rec. 5.2 criteria applicable to deciding the extent to which reallocation is possible. But if the government is to act effectively, it must commit substantial additional resources to the specific task of reinforcing Canada's distinctive cultural identity.

- 5.1 *The Government of Canada, in consultation with the private sector, should develop, before the end of 1997, a stronger, broader and more integrated strategy to ensure that a wider range of high-quality Canadian content is available, reflecting Canada's distinctive cultural realities and linguistic duality.***

Our September 1995 report presented a range of policy initiatives to improve support to Canadian culture. This report further develops some of these ideas. We do not claim that the proposals in our two reports fully represent the integrated and comprehensive policy Canada requires. They do, however, merit consideration as components of that broader policy.

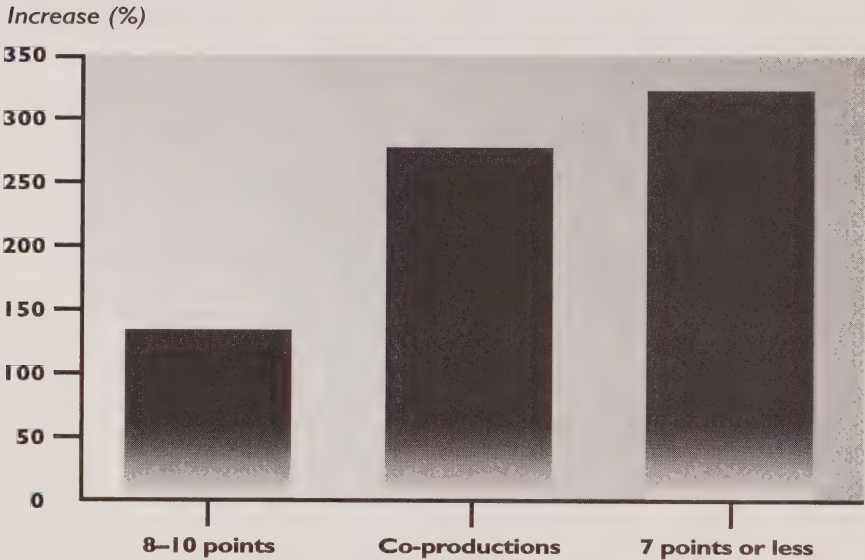
A FRAMEWORK FOR OBJECTIVES

Two factors are central to defining cultural objectives.

The first is nationality of the creators. In book publishing, the matter is simple: to strengthen Canada's cultural identity, support measures should focus on books by Canadian writers. The issue grows more complex where production involves multiple creators. In film and television, for example, a 10-point system allocates points based on the nationality of people in key creative positions. Both Canadian and non-Canadian creators may be involved, but Canadians must achieve a majority of the 10 points and either direct the production or write the script. The definition of Canadian-created films and television programs also addresses the issue of who has creative control — that is, whether a Canadian chooses the key creative people and coordinates their work. This point system for defining Canadian films and television programs is flexible and capable of refinement. The CRTC uses a minimum six out of 10 points requirement, as does the Canadian Film or Video Production Tax Credit; Telefilm Canada, the Canada Television and Cable Production Fund and Ontario's Film and Television Tax Credit require eight points. Special criteria apply to productions made under Canada's international co-production treaties (Figure 5-1).

The second key factor in defining cultural objectives is the **subject matter of the content**. This means giving emphasis to material reflecting Canadian characteristics, addressing Canadian history or reflecting Canada's social realities. This criterion is significant because the purpose of Canada's cultural policies is largely to overcome the disadvantages resulting from the relatively small size of the English- and French-language domestic markets. Content not identifiably Canadian — with no distinguishing Canadian references, characteristics or idiosyncrasies — is not at a disadvantage because of Canada's small domestic market.

Figure 5-1
Certified Canadian Productions,
1987-94



Source: Mandate Review Committee (CBC, NFB, Telefilm), "Making Our Voices Heard: Canadian Broadcasting and Film for the 21st Century," Catalogue No. CH4-15/96E (Ottawa: Supply and Services Canada, 1996).

Criteria based on creators' nationality and subject matter provide a foundation for framing objectives to measure the effectiveness of cultural measures. Government initiatives should focus on strengthening the creation, production, distribution and marketing of content made by Canadian creators or addressing Canadian subject matter.

The most successful attempt to combine both these criteria occurs in the policy goals set out in the 1991 *Broadcasting Act*. The Act states the Canadian broadcasting system should "encourage the development of Canadian expression by providing a wide range of programming that reflects Canadian attitudes, opinions, ideas, values and artistic creativity, by displaying Canadian talent in entertainment programming and by offering information and analysis concerning Canada and other countries from a Canadian point of view." The Act also states broadcast programs should reflect "the linguistic duality and multicultural and multiracial nature of Canadian society." This provides a basis for objectives applicable to all types of cultural content.

- 5.2** *Given the current fiscal environment, the government should, in its policies supporting cultural content, continue to emphasize content that reflects the distinctive character of Canadian society and its heritage; and content that represents the work of Canadian creators — reflecting Canadian attitudes, opinions, ideas, values and artistic creativity, displaying Canadian talent, and offering information and analysis concerning Canada and other countries from a Canadian point of view.*

Canadian policies now face substantial challenges in all content industries. There is a need to review, and where necessary adjust, existing policy measures to ensure they effectively meet their stated goals. Similarly, new initiatives should be designed to achieve well-defined objectives.

- 5.3** *The government should review existing policy measures to strengthen Canada's cultural identity and assess their ongoing effectiveness in achieving their intended objectives. New measures should be based upon, and designed to achieve, well-defined goals.*

RESEARCH AND ANALYSIS

While much valuable research exists on Canadian content and the industries producing and distributing it, the definition of information needs for policy making and the presentation of data should be clearer. Three issues are of particular concern.

First, differences in the definition of the Canadian content sector lead to divergent opinions on whether it is expanding and, if so, at what rate. Some characterize the sector as flourishing and the direct or indirect source of 660 000 jobs in 1992. A recent KPMG Consulting study, *The Economics of Culture and Canadian Content in the Information Society* (Ottawa, Information Highway Advisory Council, March 1997), put at \$29.4 billion the direct annual contribution of the arts and culture sector to the Canadian economy in 1994–95. While the study indicated that this sector employed 900 000 Canadians during that same period, it also underlined the need to resolve the misunderstandings around these data. Others see the Canadian content sector as much smaller, with no employment growth in recent years except in distribution — reflecting only the large amount of foreign content consumed in Canada.

Second, divergent perspectives exist on the revenues Canadian content generates in foreign markets. These discrepancies stem largely from differing understandings of the data, rather than inaccuracies. Statistics

Canada has reported that Canada's exports of cultural goods and services have been growing at unprecedented rates, reaching almost \$3 billion in 1995. But this figure includes expenditures by foreign tourists visiting Canada for recreational or cultural purposes, by foreign film and television producers shooting foreign productions on location in Canada, as well as all exports of content made in Canada, whether foreign or Canadian, cultural or commercial. Other Statistics Canada surveys suggest the export of Canadian cultural content generated only a fraction of this \$3 billion in export sales — probably about \$500 million.

Third, the financial position of domestic firms is not well understood. Current figures clearly show that Canadian-owned and controlled companies play a key role in producing and distributing products and services to sustain the ongoing Canadian dialogue. These firms' financial position and the factors influencing their capacity to perform this role need to be understood. This analysis should also address the overall structure of each cultural industry and the respective contributions of foreign and Canadian-owned firms. Despite considerable research, there remain important discrepancies in analysis and interpretation of the facts, and efforts should be made to resolve them.

The absence of reliable statistical information on Canadian cultural content and the companies producing and distributing it can adversely affect public policy. Overestimation of their financial strength risks undervaluing the need for existing or new policy measures. Similarly, overstating the export earnings of content reflecting Canada's cultural identity can lead to a downgrading of the importance of measures to provide for the domestic financing and marketing of such content.

- 5.4** *The government should establish key industry indicators and definitions with regard to both established and new forms of Canadian content in order to make available data that accurately reflect the size and financial condition of the companies producing and distributing Canadian content in English and French and the degree to which different types of Canadian content are able to recover their costs from domestic and export sales.*

STRENGTHENING THE CREATIVE BASE

As production of digital content develops technical sophistication, success will depend increasingly on a marriage of creative talent and technical skills. Canadian universities and colleges now produce high-quality graduates in many of the relevant content disciplines, including

computer graphics, animation, multimedia and Internet software design. Greater effort will be needed to develop excellence in other relevant areas and encourage advanced research and experimentation.

Artists and creators need opportunities to develop their skills by using the most sophisticated technology. They should be able to work with content providers and the most knowledgeable and skilful scientists and technicians. If such activity involves development of new production techniques or forms of content, it is likely to qualify under the existing R&D tax credit.

A number of additional options deserve consideration. The Networks of Centres of Excellence (NCE) program now supports collaboration between university researchers and industry on jointly defined research. An appropriate theme for a new NCE could be digital content and interactive media. Since 1995, we have seen a number of regional initiatives to stimulate multimedia content, with others in development. Examples include the Centre of Expertise in Applications of Multimedia in Montreal, the Edmonton Multimedia Initiative, Ottawa's New Media North and Smart Toronto. These regional consortia stimulate creative use of new media technologies by artists and provide innovative, intensive training programs in cooperation with local educational and research institutions.

As the skills needed by creators change, established creators must develop new skills. Though recent studies profile and identify deficiencies in educational and training opportunities for established forms of content, no such research exists on multimedia. The industry has reached a stage where such analysis is necessary. The Cultural Human Resources Council should take responsibility for such research.

- 5.5 *To foster excellence and act as a catalyst to innovation and development of highly skilled personnel in the Canadian content development sector in all regions of Canada, the federal government, in collaboration with provincial and territorial governments and the private sector, should invest in research projects linking artists, information industries, universities and research centres.***
- 5.6 *To foster the development of highly skilled personnel, the Cultural Human Resources Council should be encouraged to initiate research that would provide an inventory of multimedia educational and training programs throughout Canada and an assessment of existing skill requirements.***

PRODUCING FOR CANADIANS

Canadian creators' skills and talent will contribute to Canadian culture only if they can use their talent to produce content for Canadians. To a surprising degree for a developed, industrial nation with a population of 30 million, these opportunities are limited in Canada:

- Canadian sound recordings account for just 12–15 percent of the domestic market
- Canadian films earn only 3–5 percent of revenues from movie theatres and home video sales and rentals
- books by Canadian writers do better — accounting for an estimated 20–25 percent of retail sales — but the figures are still low relative to other countries of similar size.

In these and other cultural industries, domestic content has a substantially larger market share in other developed countries.

The Council believes talented Canadian creators and interested Canadian audiences exist. The potential is real for distinctively Canadian cultural products to capture a larger share of our own market. But this will not occur without a more effective plan of action. That plan must address production — and content — as well as distribution and marketing. A renewed federal commitment should involve the following measures.

A Tax Credit for Content

Connection Community Content drew attention to the precarious state of the Canadian book publishing industry and its limited ability to provide content for the Information Highway. We recommended creation of an investment incentive to ensure the industry's long-term viability.

The federal Task Force on the Future of the Canadian Music Industry has documented the financial fragility of the independent Canadian-controlled record companies that produce 92 percent of all Canadian-content sound recordings. The Task Force called for a refundable investment tax credit, based on the amount businesses invest in creating original master tapes for Canadian content sound recordings.

Government-sponsored research reveals that a refundable investment tax credit would be an appropriate and effective incentive for Canadian films and video productions, Canadian-authored books and Canadian-content sound recordings. The government has already created a tax credit for Canadian film and video production. The extension of this measure to book and sound recordings would improve

the viability of the now fragile firms producing the vast majority of Canadian books and sound recordings. Such an incentive would provide a basis for growth, just as tax incentives have assisted expansion of the film industry since 1976. As with the film industry, such an incentive does not represent an alternative to direct financial support, but an additional means of increasing the overall viability of Canadian cultural production.

We believe an investment tax credit could also be applied effectively to Canadian content multimedia production. As with the existing tax credit for film, it would be necessary to develop criteria identifying eligible multimedia productions in terms of required expenditures in Canada and the participation of Canadian creators, for example.

The existing scientific research and experimental development (R&D) tax credits have for decades provided an effective, cost-efficient and proven method of stimulating private sector investment in developing manufacturing products and processes. Though the incentive represents a small portion of federal expenditures (approximately \$1 billion out of a total of \$7 billion) on science and technology, it leverages sizable private sector investments. The R&D incentive does not apply to development of new Canadian books, sound recordings or multimedia content. Nor is any similar incentive available to Canadian companies investing in these culturally important products. Yet the risks are as high, and the competition faced by domestic firms is intense.

5.7 The precedent established in creating the Canadian Film or Video Production Tax Credit should be extended to investments in Canadian-authored books, Canadian content sound recordings and Canadian content multimedia productions.

The Role of Federal Cultural Institutions

The production of Canadian content and its distribution to Canadians are central to the mandates of federal cultural institutions such as the CBC and the NFB. As production and distribution technologies evolve, it becomes important to examine the potentially important role of these public agencies in meeting the need for distinctively Canadian content on the Information Highway. Some of these agencies, such as CBC Radio, have succeeded in using new networks such as the Internet to expand their audience base. The government should ask the CBC and the NFB to provide over the next few months a statement of what each believes it can and should contribute. The CBC and the NFB should also be asked to indicate the resources they would require and whether any proposed new media activities are consistent with their existing legislative mandates.

5.8 *The federal government should utilize Canada's national cultural institutions to generate new services and products for the Information Highway.*

The Canada Television and Cable Production Fund

The recently created Canada Television and Cable Production Fund (CTCPF) has the potential to expand substantially the quantity and quality of genuinely Canadian programming available during peak viewing hours on television. The fund, worth \$200 million a year, focusses on helping Canadian programs meet a high standard of Canadian creative involvement and control.

It is likely to alter recent trends toward rapid expansion in production tailored specifically for export and slowing growth in that aimed primarily at Canadian audiences — despite greatly increased domestic demand due to licensing of new Canadian stations and networks. The fund is essential to the creation of high-quality production reflecting Canada and the talents of Canadian screenwriters, directors and performers. Yet the fund is at present a three-year initiative, ending in 1998–99.

While most of the fund comes from government, it also receives contributions from cable companies in accordance with CRTC rules. The Commission's new Regulatory Framework for Broadcasting Distribution Undertakings requires that direct-to-home (DTH), cable and other broadcasting providers must all contribute to an independently administered Canadian production fund. To reduce overhead expenses and maximize impact, the CRTC has proposed that these moneys be administered by the CTCPF. We applaud this proposed arrangement.

5.9 *The Canada Television and Cable Production Fund (CTCPF) should be extended indefinitely as a federal cultural program, and federal funding should be sustained at \$150 million annually (including \$50 million from Telefilm Canada). The CTCPF should also administer all funds that broadcasting distribution undertakings are required by the CRTC to contribute to independently administered production funds.*

A Canadian Multimedia Fund

Limited assistance is available to support Canadian multimedia production. The Canada Council provides \$500 000 a year to encourage Canadian artists in the use of new media as a medium of artistic expression. Telefilm Canada has created a \$1-million pilot program for multimedia production and publishing assistance, which provides loans to

assist high-quality, original, interactive Canadian multimedia works intended for the general public. Loan assistance is also available through the Cultural Industries Development Fund.

Australia has created a new agency, the Australian Multimedia Enterprise Ltd., to develop Australian multimedia production. Support takes the form of project investment as well as funding for marketing, software research and concept development.

The Media Program of the European Union supports multimedia production with equity investments in preproduction and production, covering up to a third of production budgets. Project eligibility is based on potential for marketing to the general public, contribution to fostering a knowledge and understanding of Europe and supplying European content, creative and original use of the interactive and audiovisual capacity of multimedia production and enhancement of the value of existing media, and distribution plans.

These guidelines provide a useful model for a Canadian program. Such a program might also extend assistance to research on software that improves access to Canadian content, with particular attention to French-language content. Telefilm Canada could administer the new program.

5.10 A Canadian multimedia fund should be established to support the development, production, distribution and marketing of Canadian cultural and educational multimedia products that foster a knowledge and understanding of Canada and create a greater understanding of Canada's cultural identity. The program should provide assistance in the form of loans and equity financing, with annual funding from government of at least \$50 million.

Advertising and On-line Canadian Content

As the Council noted in *Connection Community Content*, section 19 of the *Income Tax Act* has been very effective in directing advertising expenditures by the private sector into Canadian media. Section 19 provides for Canadian advertisers to deduct the cost of advertising aimed at Canadians, but only if the ads are placed in Canadian newspapers, magazines, radio or TV. Canadian publishers and broadcasters receive most of their revenue from advertising. Such revenues are in turn used to finance Canadian production.

Some American estimates suggest that by the year 2000 on-line advertising could rise to 20 percent of advertising expenditures on all media. A government study of French-language content issues indicates that, if the market were appropriately structured, advertising could fund a critical mass of French-language content. Without quick action to extend the principle underlying section 19 to electronic publishing and other appropriate on-line content, a pattern will form whereby foreign-based new media attract ever more Canadian advertising. Once set, such a pattern can be difficult to break, as Canada's experience with magazines and television amply shows.

The Royal Commission on Publications (the O'Leary report) concluded: "A nation's domestic advertising revenues should be devoted to the support of its own media of communications." While global on-line networks such as the Internet raise questions how to achieve this goal, we believe, as indicated in *Connection Community Content*, the principle is sound.

5.11 *The government should take the necessary measures to ensure that in new media, as in established media, Canadian advertising supports Canadian media content.*

BUSINESS DEVELOPMENT ASSISTANCE

The measures proposed in Recommendations 5.7 through 5.11 are designed to reinforce the distinctive cultural identity of Canada and Canadians. These proposals reflect the need to continue committing substantial — and in fact increased — public resources through tax incentives, public agencies such as the CBC and the NFB, as well as direct assistance to private industry if the cultural dialogue among Canadians is to be strengthened. These resources will generate increased employment, stronger companies and greater private investment, but their primary purpose remains the furthering of cultural objectives.

There remains a need to stimulate the development of the Canadian multimedia industry as a whole, including all types of Canadian content. Recent research indicates that most Canadian multimedia companies focus on the corporate market. Two thirds of their revenues come from this market. Most industry studies reveal that inadequate access to capital substantially restricts the sector's growth potential. A survey of multimedia firms found that two thirds considered their firms inadequately capitalized.

Other challenges include incompatible production platforms, the scarcity of skilled labour, inadequate educational and training opportunities, the smallness of most companies, and limited business skills and knowledge. The industry fears that Canada will lose its best creative talent unless domestic companies and skills can be strengthened. Yet multimedia companies now make relatively little use of existing government programs and services to foster business development.

We believe the multimedia industry as a whole represents an important growth opportunity. The government should act to make the industry more aware of federal business development assistance. In administering existing programs, the government should also give higher priority to multimedia companies. As part of a more active approach, the government should examine the potential role of the Business Development Bank of Canada in responding to the industry's lack of access to capital. At a minimum, the bank should allocate a significant portion of its resources to multimedia. A specific initiative to improve access to capital also deserves consideration — perhaps not just for multimedia companies, but for all Canadian content producers. A strengthened Cultural Industries Development Fund, which provides loan capital to the cultural industries, could serve this purpose.

5.12 Through the government's existing programs of business development assistance, increased emphasis should be given to assisting Canadian companies in producing multimedia content. This should include allocating sufficient resources of the Business Development Bank of Canada to assist in meeting the capital requirements of the expanding multimedia sector.

COPYRIGHT

Connection Community Content made a number of recommendations addressing copyright protection in a digital environment. We reaffirm these recommendations, particularly their emphasis upon a fair balance between the rights of content creators and users on the Information Highway. Some of these called for changes to Canada's copyright laws.

In April 1997, Parliament approved important legislative changes (Bill C-32). The legislation improves remedies and enforcement, grants exceptions and special provisions for non-profit educational institutions, libraries, archives and museums, grants rights to exclusive distributors against the parallel importation of books, creates a neighbouring rights regime for producers and performers of sound recordings, and establishes a levy on blank audio recording media, with the royalties

going to creators, performers and producers of musical sound recordings. The recommendations in our first report addressed the new digital environment and will be dealt with in the next revision to copyright legislation. In *Building the Information Society: Moving Canada into the 21st Century*, the government acknowledged that work must proceed quickly to complete the legislative framework for promoting content creation and use of the Information Highway.

Since the Council's first report, the World Intellectual Property Organization (WIPO) has concluded a process begun in 1989 to respond to the challenges of digital technology and in particular the Internet. On December 20, 1996 WIPO adopted two new treaties, a Copyright Treaty and a Performances and Phonograms Treaty. These give authors, performers and producers of phonograms an exclusive right to authorize making their works available to the public through new interactive media such as the Internet. The treaties also require signatory nations to enact provisions for a remedy against attempts to circumvent technological measures intended to prevent unauthorized and illegal access to protected works.

Effective copyright laws and technology for their enforcement will not necessarily lead copyright owners to offer their works on-line through the Internet or some similar service. Yet without effective protection, rights holders will be unwilling to make existing works available on-line or to create new media content. This observation is particularly true for higher-cost productions. The signing of the WIPO treaties reflects an international recognition that current levels of protection are at least uncertain and at worst inadequate.

If the Information Highway is to become an important vehicle for distributing valuable works protected by copyright, Canadian law must ensure protection comparable with that available in other distribution formats and channels. We urge the government to encourage and assist the private sector in developing technological solutions for tracking and enforcing copyright and facilitating rights clearance. We recognize that such initiatives will not be sufficient without rapid implementation of the third phase of copyright revision, incorporating the measures required to conform to the new WIPO treaties.

5.13 The Government of Canada should move quickly to respond to the World Intellectual Property Organization's 1996 Copyright and Performances and Phonograms Treaties.

REACHING CANADIANS

Historically, cultural policies have involved measures to ensure not just the creation and production of Canadian cultural content, but also its effective distribution and marketing. The approach has varied, ranging from subsidized postal rates, to sponsorship of festivals, reading series and book fairs, to distribution and marketing support for industry through Telefilm Canada, to the Sound Recording Development and Book Publishing Industry Development programs, to promotion through government galleries, museums, the CBC and the NFB. The CRTC's priority carriage rules for Canadian programming services and requirements for both Canadian and French-language content to be made available to the public have also been crucial.

Measures to strengthen pan-Canadian distribution structures have also indirectly improved access to Canadian cultural content. Usually, these involve establishing and maintaining Canada's status as a separate national market for cultural works. In *Connection Community Content*, we emphasized the importance of maintaining Canada's status as a discrete national market.

Despite the range of existing initiatives, the Council does not believe the marketing and distribution of Canadian content receives adequate emphasis. The more fragmented and competitive cultural markets become, the greater the need to bring Canadian cultural content to the attention of Canadians. For example, the new CTCPPF will inject \$200 million a year into financing production of genuinely Canadian television programs, but no funding has been committed to ensure their aggressive promotion. We believe creation of a separate marketing component of the CTCPPF deserves consideration as a means of attracting Canadian viewers to fund-supported productions.

Similar challenges face Canadian cultural content in new media. It will not be enough simply to offer Canadian content on-line. As valuable copyright-protected material moves onto the Information Highway, the packaging and promotion of Canadian material will affect public awareness of and exposure to it.

Just as Canadian cultural content on the Information Highway will vary, so too must policies to ensure its effective distribution and marketing. Formulating such policies will require consultation and cooperation with industry and consumers, and the measures needed will likely change as the Highway evolves.

The new support program envisaged in Rec. 5.10 should include a marketing component. This would stimulate the creation, production and implementation of navigational and menu systems in French and English to ensure all Canadians have universal access to all domestic content. Federal cultural agencies and institutions, as well as federal publications and Web sites, can also help market Canadian content. All federal policy initiatives should attach higher priority to strengthening the distribution and marketing of Canadian content.

5.14 *Government policy should support the distribution and promotion of Canadian content as well as its creation and production. Marketing Canadian choices to Canadians should be a policy priority. These efforts should take a variety of forms and reflect participation by government, private industry and consumers.*

5.15 *The government should stimulate the development and use of Canadian navigational systems in both English and French that will ensure meaningful access to Canadian content, at "eye level," on the Information Highway.*

5.16 *The government should play an active role in directly promoting Canadian culture within Canada through its Web sites, heritage institutions, cultural agencies and publications.*

SEIZING EXPORT OPPORTUNITIES

All types of Canadian content production — including products that are distinctively Canadian — will benefit from efforts to expand foreign markets. The multimedia sector has the potential to become an important source of export revenue. In the Francophonie, an early start for Quebec companies, if followed up aggressively, can lead to substantial success abroad. While English-language producers face the challenge of strong American competition, the opportunity now exists to establish a significant presence for this nascent industry in foreign markets.

A key prerequisite for success abroad is success at home. Only a vibrant, healthy industry has the financial and human resources to launch its products successfully outside the domestic market. Thus, the first step in improving prospects for increased exports is to develop creators, producers and distributors at home.

It will also be feasible and necessary to undertake specific export development initiatives. All Canadian content producers should be more involved in trade policy development. They should benefit

from increased assistance such as statistical information on existing and emerging markets, export market development, inclusion on "Team Canada" trade missions and improved access to capital.

Though the American market will always be important, it is not necessarily the market most receptive to foreign content. The government should assist Canadian content creators, producers and distributors to target potentially more receptive markets in Europe and the Pacific Rim.

Market forces alone must not determine what Canadian content is produced here or promoted abroad. Raising the profile of Canadian culture in foreign markets projects Canada's image abroad as well as generating economic benefits. The federal government has identified Canadian culture as one of the "three pillars" of our foreign policy. Promoting Canadian content abroad can strengthen this pillar.

5.17 Producers of all types of Canadian content in existing and new media should receive increased assistance through existing federal export marketing programs, including improved access to market information, inclusion on Team Canada missions, and assistance through Canada's trade development offices and programs. Particular attention should be given to the promotion of content that reflects the highest level of Canadian creative talent and projects the image of Canada abroad.

FRENCH-LANGUAGE CONTENT ISSUES

The Information Highway is now almost overwhelmingly an English-language phenomenon, dominated by American content. Though French is the second most important language on the Internet, French-language content represents an estimated 3 percent of all Internet content. Ninety-one percent is in English.

Francophones share with all Canadians the problems of creating indigenous content for a relatively small domestic population. The challenge is greater for a language group that is comparatively small in global terms. The federal, provincial and territorial ministers responsible for the Information Highway recognized at their September 1996 meeting the need to develop a critical mass of French-language products and services for Canada's Information Highway.

We are aware that English has become and will remain in the foreseeable future the dominant language of information and communications networks such as the Internet. We urge special measures to strengthen the French-language presence on the Information Highway.

Every aspect of federal policies related to the Information Highway should aim at ensuring an effective presence for French-language content. The federal Task Force on Digitization ought to develop proposals for ensuring the availability in both official languages of digitized material from federal cultural and scientific collections. The proposed Canadian Multimedia Fund should assist the creation of navigational and menu systems facilitating equivalent access to content by French and English-speaking Canadians. The government should monitor the proposed tax credit for Canadian multimedia content to ensure that it directs investment into French-language Canadian multimedia content. If both English and French versions are produced, a higher credit should be allocated.

Several existing cultural support programs — for example, in sound recording and film — assign a designated portion of resources to French-language projects. We believe a similar requirement should apply to the proposed multimedia fund.

5.18 At least one third of the financial resources of the proposed Canadian Multimedia Fund should be allocated to French-language projects. Members of minority francophone communities should have fair and reasonable access to assistance.

Existing international co-production treaties in film and television have benefited French-language production. France and Canada have recently signed a similar treaty for multimedia production. Creation of the proposed Canadian Multimedia Fund would encourage use of this co-production treaty, since French-language co-productions would qualify for assistance.

The federal government could also reinforce its role as a model user of new Information Highway technologies by improving its linguistic practices. As the largest organization in Canada, the federal government could significantly increase the demand for products and services reflecting Canada's linguistic duality.

The *Official Languages Act* places a double obligation on federal departments and agencies. They must provide information and services to the public in English and French. As employers, they must act in accordance with the rights of federal employees to work in the official language of their choice.

Though government-wide policies and guidelines state these obligations, gaps apparently remain. The Commissioner of Official Languages identified a significant number in a 1996 special study of federal government Web sites. The Council recognizes that much communications and information technology development originates in English in the U.S. and the federal government must stay current if it is to deliver programs and services to the public efficiently.

Yet the government is equally responsible for ensuring that equipment, software and other informatics tools do not limit opportunities to work in French. For example, we are aware of the limited distribution of computer keyboards designed for easy use in French. Certain software and other informatics tools, including manuals and training courses, are also unavailable in French. If the federal government consistently required suppliers to respect the equality of English and French, the demand for informatics products and services respecting Canada's linguistic duality would grow significantly. We believe the government should put more emphasis on this area — by, for example, identifying best practices, major deficiencies and possible corrective measures.

5.19 The federal government should instruct department and agency heads to report separately on an annual basis on implementation of the Official Languages Act with regard to the acquisition and use of informatics equipment, software and related tools. These include measures taken to promote the availability and use of bilingual tools, as well as steps taken to ensure that purchases comply with Treasury Board policies and guidelines.

5.20 The proposed annual audit of each federal government department and agency should include a separate component dealing with their Internet activities and with communication provided to the public by electronic means.

Minority French-speaking communities outside Quebec experience particular difficulty in gaining access to a critical mass of French-language content. Industry Canada has established the Community Access Program (CAP) to help small rural communities gain access to the Internet. But French-speaking minority populations, because they are often in urban centres or scattered over vast areas, usually cannot qualify for CAP assistance. Specific difficulties also exist in connecting schools serving minority French-speaking populations to SchoolNet.

5.21 The Minister of Industry should review the guidelines for the Community Access Program and the SchoolNet Program to ensure that they are effective in connecting French-language communities across Canada.

The federal government is now reviewing its Official Languages Programs, particularly in light of the statutory obligation to promote and support development of minority official-language communities. This review provides an excellent opportunity to develop a communications strategy for promoting francophone use of the Information Highway.

5.22 Canadian Heritage, assisted by Industry Canada, as part of the review and renewal of the Official Languages Programs, should develop a new communications strategy for the use of media tools (television, community radio, newspapers) to increase the participation of francophones on the Information Highway.

While increased Information Highway use by francophones will inevitably increase French-language content, the global imbalance will remain. Government initiatives should thus give special attention to areas such as educational materials to ensure that Canada's Information Highway fulfils its role in reflecting cultural duality. We believe the government should play a role in increasing the quantity and quality of French-language educational materials.

5.23 The Minister of Canadian Heritage should work with ministers of education to explore ways and means of increasing the quantity and quality of original and adapted French-language educational materials for use on the Information Highway.

Chapter 6

AN INFORMATION HIGHWAY FOR JOBS AND GROWTH

The Information Highway is triggering profound technological and social changes that challenge fundamental economic assumptions. The knowledge, information, data and services travelling the Information Highway and forming the lifeblood of the knowledge-based economy are bought, sold, used and valued differently from manufactured goods such as the tables or refrigerators in an industrial economy. The scope and pace of innovation in the new economy redefine markets and industries with bewildering speed. Meanwhile, trade liberalization is creating a tightly knit global economy qualitatively different from the relatively discrete national economies of the industrial age.

This transformation is already upon us and it has far-reaching implications for jobs and economic growth. The Internet is now a global mass medium that many see as the core element of the Information Highway. At the same time, successive generations of ever more powerful computer hardware and software platforms are accelerating the pace of change. If we are to create a successful knowledge-based economy and society, Canada must adapt to these technological trends and respond to their economic and social implications.

The Council's work since September 1995 has built on and expanded the economic agenda in our first report by carrying out two kinds of analysis. The first examines the macro-level issues related to the dynamics of modern, knowledge-based economies, especially the relationships between technology, employment, productivity and growth. The second looks at economic sectors strategic to the development of a knowledge-based economy in Canada. The latter focusses on the specific application areas of health, learning and small business as clear examples where the transformative effects of new technologies are most pronounced and where astute public policies can create economic growth and jobs.

DYNAMICS OF THE KNOWLEDGE-BASED ECONOMY

While most agree that technological change has brought about a fundamental economic shift,⁸ there is much less unanimity about the precise dynamics of this transformation and its policy implications. The debate remains vigorous within both national governments and the academic community. To explain the basis for future economic growth and prosperity, major international organizations such as the OECD (*Technology, Productivity and Job Creation*, Paris, 1996) have begun major research programs to examine the nature of the relationships among technology, productivity, growth and employment in the knowledge-based economy.⁹

Many see parallels between the current economic transition and the industrial revolution. Then, an urban, manufacturing economy displaced an essentially rural and agricultural society. Now, we are experiencing an equally profound shift to a knowledge-based economy. The challenge is to assess the nature of the transformation and its broader implications for society as a whole.

Several aspects of a knowledge-based economy are already apparent.

⁸ Surveys of Canadians show considerable agreement, among employers and workers alike, on the fundamental economic changes occurring as a result of technology. See Angus Reid, *Workplace 2000: Under Construction: Survey of Canadian Employees* (Toronto: Royal Bank of Canada, Fall 1996).

⁹ Many of the same issues are discussed in a study by the Conference Board of Canada, *Jobs in the Knowledge-based Economy: Information Technology and the Impact on Employment* (Ottawa: Conference Board of Canada, 1996).

First, innovation, ideas and information drive growth to an unprecedented degree. In both industrial and knowledge economies, higher living standards derive more from our being able to consume the products of innovation — new and better things produced in superior ways — rather than just more foodstuffs, clothing and basic shelter than our ancestors. In a knowledge-based economy, however, ideas and information overshadow physical goods and services as the primary units of production, distribution and consumption.

Ideas and information exhibit very different characteristics from the goods and services of the industrial economy. For example, much more than is the case with a frozen dinner or a haircut, the social value of ideas and information increases to the degree they can be shared with and used by others. More important, the costs associated with their production are distributed very differently over time. While upfront costs associated with the production of traditional goods such as a car or house may not necessarily be high, each item is still costly to produce. The more of these one produces, the more likely one will eventually encounter scarcities that drive up production costs and reduce the size of social returns. In the case of innovation, ideas and information, the opposite would seem largely to be the case. While upfront development costs can be very high, the reproduction and transmission costs are low. The more such items are produced, the greater the social return on investment.

The systemic effects of these differences are poorly understood. Although economists have studied how individual firms and industries such as book publishing produce and distribute information, they have yet to acquire an overall understanding of the knowledge economy. The behavior of the interacting markets in an economy dominated by the production, distribution and consumption of information goods is far from clear. What is clear is that traditional economic theories about market behavior do not really fit the knowledge economy and therefore cannot fully predict how markets will produce and provide these new kinds of goods and services.

Consequently, as Canada strives for maximum competitive advantage in a knowledge-based economy, it becomes very important to revisit assumptions about the dynamics of this new economy, both here at home and around the world. Otherwise, Canadians will fail to anticipate or understand the full impact of this transformation.

SEIZING THE OPPORTUNITIES

Although we still do not fully understand the long-term implications of the present transition, agreement does exist on the immediate measures needed to sustain the competitiveness of national economies. As the Council emphasized in *Connection Community Content*, government must create a competitive environment to encourage investment in the Information Highway, the key infrastructure for this new economy.

As noted in Chapter 2, the government has made significant progress in this regard, but should not slow down its efforts to complete the agenda for creating a competitive environment that will favour the most efficient use of technology on Canada's Information Highway.

- 6.1 *The emphasis on creating an environment to promote investment in infrastructure remains vital for economic growth, and Canada must continue to pursue these policies to guarantee that it maintains its competitive position in the world and that Canadians can enjoy the full benefits of the Information Highway.***

While development of this infrastructure is critically important, it is the content, applications and services carried on this infrastructure that will be the life-blood of the knowledge-based economy and its major source of jobs and economic growth. Thus, a vital complement to building this infrastructure is a strategy or strategies to encourage new Information Highway-based products and services for a global economy. To ensure these technology applications will be a major source of new products, industries and jobs, these strategies should identify and emphasize applications that create new employment and growth, rather than those that simply reduce labour costs, and contribute to job losses and underemployment.

- 6.2 *More needs to be done to foster the development of markets for new Information Highway products and services, which are the economic base for the new economy and which will translate into wealth and employment. This will entail policy and other measures aimed at stimulating both the supply of and demand for Information Highway content, applications and services.***

A key element of such strategies will be the creation of a legal and policy environment that promotes electronic commerce and economic activity on the Internet, thereby ensuring that its economic promise is realized. Secondly, access to high-quality infrastructure at low prices will be pivotal in developing a broad consumer base for electronic commerce, content and new services. Finally, government also can play a major role in promoting service development through its

support for the expansion of learning and health applications on the Information Highway. Elsewhere in this report, we propose several specific measures that can be taken in each of these areas.

EMPLOYMENT AND INFORMATION TECHNOLOGY

According to public opinion polls, most Canadians support government measures to encourage information technology and the Information Highway. Eighty-eight percent agree that “technology and information are the sectors of the economy where we’re going to see the most growth.” Alongside this apparent optimism is a real concern about the implications of the technology for jobs. One poll (Ekos Research Associates, *Rethinking Government*, 1996) revealed, for example, that 84 percent of Canadians agree that “as technology becomes more important in the economy, some people, and older workers in particular, are going to be left behind.” Fifty-one percent supported the statement, “I really worry that new technologies take away more jobs than they create.”

This malaise is also apparent in the contentious debate taking place in Canada and around the world about the relationship between technology and jobs. The debate reflects the importance of employment in an advanced modern economy and the prevailing uncertainty about the ultimate impacts of information technology on jobs and wages. These impacts are fundamental, since for most individuals, wages provide the purchasing power that allows access to society’s goods and services. Income and employment are also critical to sustaining consumer demand in the economy, as Henry Ford acknowledged many years ago when he advocated paying his workers high enough wages to buy the cars they were producing. Just as high levels of employment can lead to a spiral of strong demand, increased output, rising demand for labour and steady economic growth, low employment can weaken demand, decrease output and cause further declines in the demand for labour. Even if not viewed as highly probable, the severity of the latter scenario — especially combined with the public sector’s limited capacity to stimulate demand — has prompted continuing debate regarding whether a technology-driven decrease in demand for labour could precipitate such a decline.

The facts do not support any definitive answer to such questions. Despite impressive technological advances, employment levels have not greatly improved in most parts of the world. Although many high technology

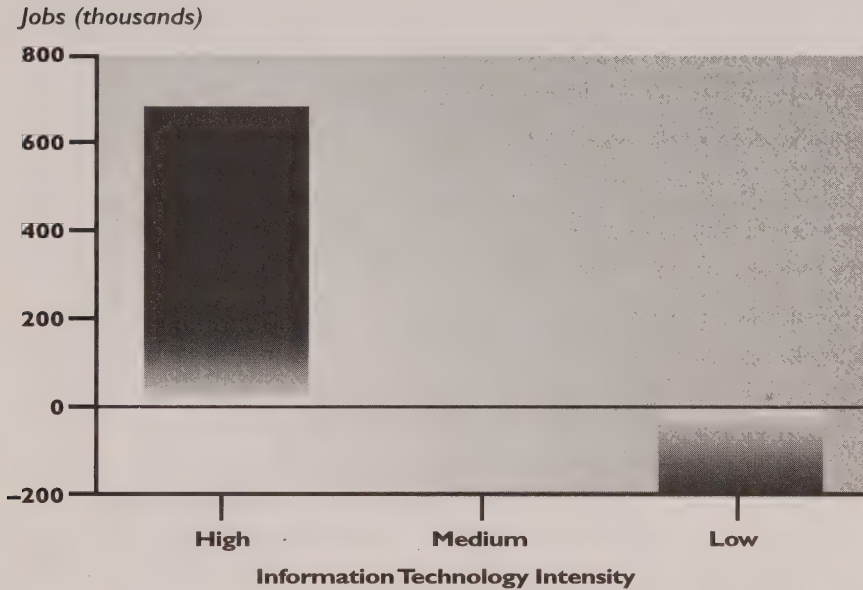
sectors have experienced significant job gains, there have been well publicized examples of high technology areas losing jobs during periods of expansion. For example, the information technology sector's output grew an average compound rate of 8.1 percent a year between 1990 and 1995, pushing its share of gross domestic product from 5.5 percent to 7.6 percent. Yet employment growth in the information technology sector was fairly flat, with the number of jobs falling from 316 459 in 1990 to 297 697 in 1993, before recovering to 324 042 in 1995, reflecting only a 0.5 percent compound average annual growth rate. This relatively poor employment performance was due to large layoffs in telecommunications (as carriers adjusted to the shift from a regulated monopoly to a market environment), which offset the steady employment gains in software and services.

A recent study by the Conference Board of Canada, *Jobs in the Knowledge-based Economy: Information Technology and the Impact on Employment* (Ottawa: Conference Board of Canada, 1996), assesses how information technology (IT) intensity correlates with employment across various sectors of the Canadian economy. It concludes that IT-intensive industries showed gains in employment (Figure 6-1). The study also reveals that information technology can intensify the mismatch in skills between the demand and supply of labour. The Conference Board's central conclusion is that "Information technology is not a job killer." The study does in fact find a positive correlation between information technology and employment, and demonstrates that IT-intensive industries themselves are net direct creators of jobs. However, the results do not prove conclusively that information technology is an overall job creator in the economy as a whole.

The Conference Board study and other research linked information technology to employment gains in "managerial" and technical occupations, but also to job losses in some industries, notably manufacturing. Here in Canada and around the world, particularly in Europe, these effects feed growing public concerns and uncertainty about the impact of technology on employment and the workplace.¹⁰ This public perception has produced strong apprehension about income inequality and a

¹⁰ Chapter 7 directly addresses the impact of technology on the workplace. According to Angus Reid, *Workplace 2000: Under Construction: Survey of Canadian Employees* (Toronto: Royal Bank of Canada, Fall 1996), two fifths of survey respondents agreed that "in the past year, new computer technology and software has significantly changed the way I do work." Seventy-eight percent said they thought the technology had made their job easier.

Figure 6-1
Employment Change by Information
Technology Intensity, 1986-92



Source: Conference Board of Canada, *Jobs in the Knowledge-based Economy: Information Technology and the Impact on Employment* (Ottawa: Conference Board of Canada, 1996).

call for more convincing evidence that the Information Highway can lead to net job gains in the near and medium term. In the media, upbeat reports on the economic and social benefits of the technology appear beside forceful expositions by Rifkin,¹¹ Forrester,¹² Angell¹³ and Menzies,¹⁴ who argue that the current transformation will have negative impacts on employment, equity, leisure and social cohesion.

If true, such critiques do not bode well for the development of markets for information products and services. Their consumption requires not only income, but also the time to absorb and enjoy them. Paradoxically,

¹¹ Jeremy Rifkin, *The End of Work: The Decline of the Global Labor Force and the Dawn of the Post-market Era* (New York: Jeremy Tarcher/Putnam, 1995).

¹² Viviane Forrester, *L'horreur économique* (Paris: Fayard, 1996).

¹³ Ian Angell, "Liberty and Property," *London School of Economics Magazine*, Summer 1995.

¹⁴ Heather Menzies, *Whose Brave New World? The Information Highway and the New Economy* (Toronto: Between the Lines, 1996).

leisure time is falling for many high-paid knowledge workers, while the jobless have nothing but leisure time. A situation where those with money have little time, and those with time have little money is not auspicious for developing markets in the knowledge-based economy. The scope and intensity of this debate point to the need for further economic investigations of the impacts of the technology and the means of dealing with them. Much will depend on the extent to which economic policies encourage industries to deploy the technology in a manner conducive to creating jobs.

Despite short-term dislocations arising during the period of adjustment to these technologies, the Council believes failure to pursue an aggressive policy promoting information technology and the Information Highway will cause even greater economic hardship. Without such policies, Canada will lose the jobs created by our vibrant information technology and telecommunications sectors. In addition, the enabling effects of the technology will be less available to all Canadian industries, causing them to fall behind internationally and leading to further job losses.

We believe the Information Highway promises the best opportunities for economic growth and job creation over the long term, and the broader development of the information economy in the area of services and content creation will hasten this process.

The Council also recognizes no iron-clad guarantees exist that the knowledge economy will provide full employment. As with all new technologies, unintended negative consequences may occur in the labour market. Canada needs to determine whether mitigating measures are necessary and, if so, what they are. Already some jurisdictions are exploring those measures. In France, Germany and Canada, industries and policy makers are proposing innovative labour market measures to address the employment issue specifically. These include shortened work weeks and fiscal incentives to increase employment. In the long run, it may be necessary to distribute work more evenly. Government should also immediately revisit current payroll and other profit-insensitive taxes to assess the degree they affect job creation in Canada.

- 6.3** *The federal government should conduct further policy research on the impact of new technologies, and encourage and contribute to the ongoing public discussion and debate aimed at exploring alternative means to deal with the possibility that the number and quality of jobs generated by the Information Highway may not meet expectations. (See Rec. 7.1)*

HUMAN RESOURCES ISSUES IN THE INFORMATION TECHNOLOGY SECTOR

Rising youth unemployment and shortages in highly skilled information technology workers may undermine Canada's success in building a knowledge economy.

A highly skilled information technology work force is critical to Canada's competitiveness as we move toward a knowledge economy. Many believe a shortage already exists and is being worsened by the loss of individuals from Canada, particularly to the United States. Canada needs to determine the seriousness of this problem and whether it is worse here than in other countries.¹⁵

6.4 *Industry Canada and Human Resources Development Canada, with the involvement of key stakeholders such as technology associations and educational and training institutions, should:*

- a. determine the availability of required information technology skills in Canada by undertaking further research and analysis as required;***
- b. publish a report on their findings; and***
- c. suggest policy measures as appropriate.*** (See also Rec. 3.4 as well as Recs. 5.5, 5.6 and 7.4)

Canada's young people should form the core of the technologically literate, versatile work force in the knowledge economy of the future. The Information Highway featured highly in the federal government's Youth Employment Strategy launched in February 1997, but there is a continuing need for initiatives in this area. The employment and earnings prospects for young and less-educated workers have recently deteriorated relative to more experienced, highly educated workers. This situation underscores the need to encourage Canadian youth to stay in school and gain the skills needed to work in the new economy. For young Canadians without the opportunity to return to school, the present trends reinforce the need to ensure that lifelong learning actually becomes a key design element of the Information Highway.

¹⁵ While current difficulties in finding qualified people in Canada's information technology sector are a concern, the *World Competitiveness Yearbook* (Lausanne, Switzerland: International Institute for Management Development, May 22, 1997) shows that Canada's international ranking in the area of human resources went from twelfth in 1993 to fourth in 1997. This finding indicates that, relative to other countries, Canada's overall level of skills and education is competitive.

- 6.5** *The government should monitor current programs and the overall picture of youth employment in Canada, focussing in particular on the needs for appropriate education and skill levels in a rapidly changing knowledge society and for lifelong learning to be a key design element of the Information Highway. Government should be prepared to take further action to ensure that Canada's young people can make a full, meaningful contribution to working life in Canada, since their involvement and skills will be critical to meeting our human resources needs in the knowledge economy.*

SECTORAL STRATEGIES

In the past, different communications technologies provided different kinds of services to consumers. Cable television offered broadcasting services and telecommunications companies offered telephone and telecommunications services. Now all these technologies are converging, shifting market structures and corporate strategies away from transmission hardware and toward the integrated delivery of services, content and applications demanded by particular sectors of the economy, such as financial services, health or education.

As long as access to content, applications and services is easy and effective, the transmission technology used is increasingly less important to success in the market than the design of packages of services, content and applications that satisfy particular sectors. This change represents a significant evolutionary step toward a knowledge-based economy and should be taken into account by government policy makers.

The Council focussed on three sectors that are important economically, play a central role in communities right across Canada and can provide real opportunities for job creation:

- SMEs, which play a key role in economic growth, job creation and community development throughout Canada
- Canada's \$70-billion-a-year health sector
- learning, a major source of government expenditure and a strategic sector if Canada is to have the skilled, versatile labour force required in a knowledge-based economy.¹⁶

¹⁶ Activities such as health and learning will represent important future sources of jobs. As Microsoft CEO Bill Gates recently noted, "Take education. Why not, if there's productivity here, have five children in a classroom? Take medicine. If there's all this productivity, why not have a much better, personalized health care?"

Small Business and Electronic Commerce¹⁷

In *Connection Community Content*, we stressed the need to eliminate barriers to use and development of the Information Highway by all Canadian companies as a means of promoting their growth and competitiveness. This imperative is especially urgent in the case of small businesses, which often face significant challenges in adapting to information technology.

The importance of small businesses to the Canadian economy is incontestable. Fifty-seven percent of Canada's economic output comes from its more than 2.2 million SMEs. Firms with fewer than 100 employees contribute 42.5 percent of the private sector's gross domestic product (GDP) and 49.5 percent of employment. Since 1983, the SME sector has been virtually the only net generator of jobs in the entire Canadian economy.

These figures reflect the innovative, entrepreneurial and opportunistic character of small businesses. Their dynamism is also apparent in the incidence of business births, expansions, contractions and closures. At the same time, perhaps because their presence pervades Canadian communities, small businesses represent an important source of social and economic stability. The emergence of electronic commerce and the development of the Internet as a platform for business activity of all kinds are critical to putting small business on the Information Highway.

The increasing use of communications and information technology by businesses large and small, and its potential to facilitate the full range of business functions from production to retail sale, have magnified the importance of creating a hospitable environment for electronic commerce. By becoming a model user of information technology in serving the public (see Chapter 8), the government has made significant progress toward laying a solid foundation for electronic commerce. However, impediments still remain and the ground rules for electronic commerce require further clarification if Canadian companies are to invest in it and exploit fully its economic possibilities. Quick completion of the legal, policy and regulatory framework for electronic commerce remains a matter of urgent priority.

¹⁷ In preparing this section, the Council worked closely with John Bulloch, chairman and chief executive officer of the Canadian Federation of Independent Business. This section also summarizes the contents of the background paper by the IHAC Secretariat and the Canadian Federation of Independent Business, *Small Business and the Information Highway* (Ottawa: Industry Canada, 1997).

6.6 *To provide the necessary measure of certainty in the marketplace, the government must move quickly to:*

- a. ensure that the legal, policy and regulatory framework for electronic commerce is in place;***
- b. remove the impediments and barriers to electronic commerce; and***
- c. clarify the ground rules pertaining to commercial activities conducted electronically.***

Internet technology allows small businesses to do new things and organize themselves in different ways. Personal networking can now span a much larger geographic area, making new forms of collaboration possible. Better communication and more timely, precise information have reduced the need for inventories, representing a significant saving to SMEs. Employment arrangements can become more flexible, with more outsourcing of labour, thereby reducing profit-insensitive taxes such as payroll and property taxes. Business-to-business on-line commerce is growing quickly, and will likely allow SMEs to eliminate 90 percent of their transactional paper operations, substantially reducing costs.

Small businesses for the most part are moving rapidly to gain access to the Internet. By the end of 1996, some 25 percent had Internet access, jumping to 41 percent for firms with more than 50 employees. These figures may double by next year.

Not all will be winners. The Internet may put at risk some SMEs — for example, traditional intermediaries such as travel agents and retailers. Other lines of business such as electronic brokerage, electronic data interchange (EDI) expertise and software development will prosper. The degree of success by small businesses in these areas will depend on their capacity to overcome the significant challenges they face in adapting to information technology. Fortunately, both the Canadian Federation of Independent Business and the government operate excellent programs to assist small businesses.

Other areas exist where the government can make an important difference. One is for government to help promote the diffusion of the Internet throughout the Canadian economy by expanding Internet delivery of government services and information. Another is to provide small businesses with additional information about how to make best use of the new technology. It will also be important to provide senior

personnel in small businesses with opportunities for training in the new technologies. For these measures to be effective, a close working relationship between government and the small business sector is crucial.

- 6.7** *Government should expand its use of the Internet for the delivery of government services and information to the Canadian public, the small business community and to other governments in a manner that:*
 - a. accelerates the roll-out of the Internet;*
 - b. widens public access and digital literacy; and*
 - c. enhances consumer value related to Internet use. (See Rec. 3.8)*
- 6.8** *In cooperation with the private sector, the government should supply SMEs with more information on the costs of training, hardware and software and on the appropriate information technology products, best practices and applications for specific business purposes.*
- 6.9** *The government, in cooperation with the private sector, should ensure that further training opportunities, especially for senior personnel, are made available to help businesses get on-line, learn to navigate the Internet and identify the information technology products most beneficial to them.*
- 6.10** *The government should increase working partnerships between itself and SMEs to ensure ongoing dialogue on factors affecting the use of the Information Highway by small businesses.*

Creating the Health Iway

Information technology can transform Canada's health system, allowing it to provide higher-quality care in a cost-effective manner while creating new jobs, markets, products and services. Even though most of the health system lies in the public sector, the private sector has a key role to play in realizing these benefits. A commercial telehealth industry is already emerging in Canada, creating new jobs, services and products. Meanwhile, global demand is growing for products and services being developed to seize these opportunities.

Critical to achieving these benefits will be the development of a national integrated health information network. In response to the Council's Phase I recommendations, the Minister of Health promised in May 1996 to discuss a national strategy for such a network with a broad base of stakeholders.

In *Towards a Canadian Health Iway: Vision, Opportunities and Future Steps* released in September 1996, CANARIE further explored this area and called for specific measures to develop this strategy under the leadership of Health Canada. The report recommended that Health Canada, with Industry Canada, CANARIE and IHAC, create a council of senior health leaders to hold a national congress for key stakeholders. CANARIE also proposed six demonstration projects and four research pilots as first steps toward a national strategy. Finally, the report called on Industry Canada to review the competitiveness of Canadian telehealth or health-information technology industries so that they will be in a position to seize the opportunities now on the horizon.

6.11 The Council strongly supports the recommendations in CANARIE's Health Iway Report and urges the ministers of Health and Industry to act on them.

The report also saw future development of a Canadian Health Iway as critically linked to measures to preserve the privacy and confidentiality of health information. The Council agrees and believes such protection should be a guiding principle in implementing all the Council's recommendations in this area.

Since release of the report, Health Canada has taken the lead in developing the National Health Strategy.

In parallel with this effort, Industry Canada is now completing a Sector Competitiveness Framework for the telehealth industry. Preliminary work suggests the industry faces significant challenges because of the small Canadian market, strong foreign competition and a lack of skilled individuals. Yet opportunities also exist. Whole new professions are emerging in the areas of telenursing and health information. Meanwhile, international markets for Canadian expertise are opening up.

The National Forum on Health, established by the Prime Minister in 1994, recently released its final report, *Canada Health Action: Building on the Legacy* (Ottawa: National Forum on Health, February 1997). The report addresses many of the issues raised by the Council, including management of health information. A key recommendation calls on the Minister of Health to "champion the creation of an evidence-based health system." This would involve development of a nationwide health information system, including a national health data network linking national, provincial and territorial agencies.

These efforts by IHAC, CANARIE and the Forum culminated in the February 1997 Budget announcement of \$50 million over three years for a Canada Health Information System — a coordinated national system of health information to serve health care providers and planners across the country. The system will consist of a national health surveillance network, a health information clearing house, and a First Nations health information system. Other Budget initiatives, such as the Canada Foundation for Innovation, will also make funds available for health and information technology initiatives in Canada.

The Council welcomes the initiatives associated with the establishment of a Canada Health Information System and considers these commitments a major step toward making Canada a world leader in building the Health Iway.

6.12 *To meet expectations and to fulfil the promise of the Health Iway, the federal ministers of Industry and Health, together with provincial governments, should:*

- a. develop a framework to encourage growth in Canada's health industries, with particular reference to software, information systems and "intelligent" equipment; and*
- b. proceed rapidly with plans to complete the wiring of health institutions, such as hospitals, medical laboratories, research establishments and community clinics, to take immediate advantage of advanced networking opportunities.*

In the meantime, CANARIE's application-oriented research remains a key instrument in catalyzing Canadian efforts to exploit the benefits of the new technology in health, telemedicine, learning and helping people with disabilities. In the Council's view, this research program should continue and be expanded.

6.13 *CANARIE should continue and expand its research program aimed at developing innovative Information Highway applications in health and telemedicine. The federal government should consider this aspect of the CANARIE program and other applications-oriented research in fields such as learning and the needs of persons with disabilities in planning its future work in the health area.*

Technology-assisted Learning

From the outset of its work, the Council has stressed the vital importance of lifelong learning as a “key design element in Canada’s Information Highway.”¹⁸ Learning and particularly lifelong learning are both a precondition for developing the human resources needed in the knowledge economy and a way of ensuring that Canadians can qualify for the jobs available in that economy. Furthermore, the deployment of technology-assisted learning through the Information Highway represents a real industrial opportunity for Canada.

Industrial Development

The challenge for this new learning industry resides in effectively combining content, hardware and human talent to create business opportunities and jobs. By adapting technology to defined pedagogical outcomes and converting learning materials into digital format, Canadians can develop new products capable of exploiting the full potential of the technology. However, very few companies can bring together in their own organizations the necessary technological expertise, accredited knowledge and ability to design instructional materials. For this reason, partnerships and alliances have become critical to developing sophisticated learning products.

Several collaborative Canadian efforts, such as the Knowledge Connection, TeleLearning Network of Centres of Excellence, and the Canadian Network for New Media Learning, are performing specialized research on the contribution of technology to the learning process. These consortia also engage in joint development and marketing of products and services — an essential step toward strengthening Canada’s competitiveness in domestic and international markets.

- 6.14** *The federal government, through instruments such as the Networks of Centres of Excellence, CANARIE and procurement for its own internal training and professional development programs, should encourage the formation of consortia that link knowledge and technology providers for the development and marketing of technology-assisted learning products and services, particularly for international sales.*

¹⁸ Lifelong learning is more fully addressed in Chapter 7.

These commercial operations will flourish only with the appropriate environment and incentives. Governments and the private sector should work together to overcome institutional barriers and other impediments to applying information technologies in the learning field. For example, if technology-intensive products rich in content are to be competitive, they will need to develop effective processes for assessing their quality and securing their accreditation from learning institutions. In Canada, no focal point exists for collaboration between governments and the private sector to address public policy and industrial development issues in this area.

6.15 A mechanism should be established to resolve outstanding policy issues surrounding the application of information technologies to learning. (See also Recs. 7.5 and 7.6)

Multimedia Technologies for Learning

Multimedia technologies¹⁹ are quickly becoming the primary platform for technology-assisted learning. The growing importance of the Internet, which has accelerated the network delivery of computer-based learning applications, has reinforced this trend.

It is expected that the global market for multimedia products will grow by 25 percent a year, attaining an estimated value of US\$24 billion by 1999. Both in Canada and abroad, changing skill and knowledge requirements in the private sector are producing a growing corporate market for technology-assisted learning materials and content resources. In corporate training, sophisticated multimedia networking and courseware have become major productivity tools. For example, Industry Canada studies estimate savings of up to 75 percent for "New Media Learning Materials" over conventional training methods. By 2005, the savings could amount to \$2 billion a year in Canada alone. The largest potential users of these learning materials are the health sector and the financial services, environmental, telecommunications and information technology industries.

¹⁹ Multimedia content refers to digitized material that integrates audio, still and moving pictures, traditional text and numerical data in an interactive context. This technology enables companies to create new kinds of interactive computer products and services for delivery over networks or as CD-ROMs. Examples include computer games, encyclopaedias, training and advertising. Products are geared to four markets — corporate, educational, government and home.

Canada's multimedia industry has a real opportunity now to develop its multimedia learning industry to take advantage of these emerging domestic and global corporate training markets, according to an in-depth study, *Market Assessment Study of New Media Learning Materials*, sponsored by Industry Canada and Human Resources Development Canada (Ottawa: Supply and Services Canada, 1996). Canada already has 500 companies involved in multimedia production and publishing. A third of these companies are new, while two thirds are established firms that have diversified into multimedia from other sectors (e.g., software, film, publishing, broadcasting, advertising, consulting, training). Two thirds are actively seeking strategic alliances and foreign markets. However, half have fewer than 10 employees, and most face difficulties in marketing, raising capital and finding skilled employees.

Given multimedia's enormous commercial potential, the Council encourages developing Canada's expertise in this area. Indeed, if Canada is to maintain its position in content and service production for the Information Highway, it must strengthen its capabilities in this arena.

6.16 *The federal government, through the departments of Canadian Heritage and Industry, should move quickly to develop a strategy to respond to the diversity of issues facing Canada's multimedia industry. This strategy should address core issues relating to cultural policy, trade promotion, sector skills, and business development, as well as promoting greater use of multimedia training. (See also Chapter 5)*

Such a strategy would involve:

- work to clarify the stages of multimedia production and identify the needs and issues for industries at each stage
- development of systematic data, which currently are sparse and unreliable
- steps to ensure that Canadian products are marketed abroad
- government, industry and labour collaboration to employ multimedia technologies as an improved training solution for Canadian business and government and as a lifelong learning tool for workers.

ECONOMIC STRATEGIES AND THE INFORMATION HIGHWAY

During the brief time since release of *Connection Community Content*, the Information Highway has evolved at a dramatic pace. Events have confirmed that the economic concerns in our first phase of work — a competitive environment, infrastructure development, research and development — remain crucial areas for action. The Council's current efforts reinforce the conclusions from Phase I, but also address some key emerging areas.

The Council has seen growing public uncertainty about the impact of technology on employment. For this reason, we see a need to complement the efforts to maintain Canada's leading position in the global knowledge-based economy, with further policy research and consultations to determine whether mitigating mechanisms are necessary to address unanticipated impacts of the new technology on employment.

The movement toward a knowledge-based economy has also featured a marked trend away from a narrow focus on technology and infrastructure to a broader, more customer-oriented emphasis. This involves the development of applications that transparently incorporate multiple technologies to meet the information technology needs of specific sectors and clients. As a result, new content, applications and services are emerging domestically and internationally as an engine of economic growth. We encourage government to direct more attention to policies to stimulate both the supply of and demand for new Information Highway products and services.

At the sectoral level, the Council found that technology is improving efficiency, is providing new ways of meeting companies' and consumers' needs, and is creating real economic growth and jobs. For the health, learning and small business sectors, new content, applications and services represent significant opportunities. In each, the potential benefits of the Information Highway are considerable, and our recommendations focus on creating the right environment and policies to realize that potential.

On the basis of the evidence, we feel optimistic about the overall impact of the Information Highway on the Canadian economy. The innate potential of the technology, prudent government action and the unique skills and resources of Canadians should ensure Canada's successful transition to a knowledge economy. Our recommendations aim at moving Canada with greater speed and focus in this direction.

Chapter 7

PEOPLE AND THE INFORMATION SOCIETY: LIFELONG LEARNING AND THE WORKPLACE

*More changes, more rapidly — this is the way
we will experience work and learning in the
knowledge society.*

Work itself and the way it is carried out have changed significantly even in the past decade. Canadians can now anticipate three or four different careers requiring increasingly diverse skills during our working lives. Part-time work, telework, contract work and self-employment are becoming more prevalent and are raising important issues for employees and their representatives.

These changes in the workplace also mean that people must learn constantly and differently to adapt and progress. No longer will learning be limited to formal education. It will be a lifelong experience linked to work and personal life.

The Information Highway plays an important role in these changes — as cause, effect and potential solution. Knowledge and information are at the core of our work. With rapid advances in computers and telecommunications technologies, people must constantly acquire new skills throughout their lives. The Information Highway offers an opportunity to improve the way in which Canadians work and learn, while at the same time raising important questions about the nature of employment.

PERSPECTIVES ON WORK AND LEARNING

In *Connection Community Content*, the Council emphasized the important relationship among work, learning and the Information Highway. We also pointed out the "two divergent philosophical approaches regarding the respective roles and responsibilities of government versus the private sector in dealing with the employment impacts of our changing economy."

According to that report, "The first approach was based on a commitment to full employment as a central policy goal of government. It saw the government taking a proactive role in job creation, in mitigating job losses and in facilitating worker adaptation. Accordingly, it called for government- and employer-sponsored training programs, work sharing, phased-in retirement of older workers and facilitation of worker mobility."

In contrast, "The second approach is more market-driven, assigning the government a role as a facilitator rather than a central actor in the information economy. Accordingly, the government's responsibility is to create a flexible and innovative economic and regulatory environment conducive to investment and job creation by the private sector."

Jean-Claude Parrot, a Council member and Executive Vice President of the Canadian Labour Congress, disagreed sufficiently with many of the views held by other IHAC members that he issued his own minority report appended to the Council's Phase I report. This appendix contained a number of recommendations addressing and elaborating upon issues related to the changing workplace.

In taking note of this appendix, the Council wrote, "The aforementioned philosophical differences should not obscure the fact that there were important areas of agreement among a majority of Council members — notably on recognizing the critical contribution of employment to the wealth and quality of life of Canadians and of lifelong learning to a mobile and well-qualified work force." In fact, the Council made six complex recommendations on employment and the workplace and many more on lifelong learning.

GOVERNMENT ACTION

In *Building the Information Society: Moving Canada into the 21st Century*, the federal government responded to both the majority and minority reports.

The government recognized that while the Information Highway will create thousands of new jobs for Canadians, the need will remain to develop new skills and working arrangements. The government committed itself to tracking these impacts on employment and ensuring that labour standards continue to provide adequate protection for Canadian workers.

Under the leadership of the Minister of Labour and with the sponsorship of the Advisory Committee on the Changing Workplace, the government also organized a *National Forum on the Information Highway and Workplace Issues* to ensure that workplace issues receive wide public discussion. The National Forum took place simultaneously at six locations across Canada. For the principal background document, the Council prepared a discussion paper incorporating the views of both labour and business.

The government also recognized the importance of lifelong learning for Canadians, saying that, as the Information Highway expands, so too must learning opportunities. In the government's view, learning should become an enriching, lifelong process vital to continuing employment and success: "A flexible, efficient means of developing our human resources will therefore lie at the core of Canada's efforts to ensure economic growth, economic development and job creation."

While noting that responsibility for education lies with provincial and territorial governments, the federal government committed itself to facilitating and fostering cooperation among the various stakeholders — including governments, learning institutions, sectoral councils, the private sector, business associations, labour organizations, associations for learning technology professionals, women's groups, community groups and other non-governmental organizations.

The government now operates a number of specific programs to address these issues.

- The SchoolNet partnership coordinated by Industry Canada plans by 1998 to have all 16 500 Canadian schools connected and sharing learning experiences.

- The Office of Learning Technologies (OLT) at Human Resources Development Canada (HRDC) is working with partners to: expand innovative learning opportunities through technologies; promote effective use of learning technologies; support assessment, research and testing related to the use of learning technologies; and increase the availability and sharing of knowledge and quality information about learning technologies.
- The TeleLearning Network of Centres of Excellence, launched in November 1995 at Simon Fraser University, is the first in the world to link world-class researchers in a cohesive national effort to develop advanced teaching approaches and new technologies for a knowledge economy.
- Industry Canada has created a comprehensive database of information about Canada's multimedia producers — including the new media learning industry — overcoming barriers to innovation and helping advance development of information products for both Canadian suppliers and users.

INTERNATIONAL PERSPECTIVES: THE RELATION BETWEEN WORK AND LEARNING

As the government was setting these initiatives in motion, the Council became aware of new international research illuminating the critical importance of learning, employment and workplace issues to a knowledge society.

The International Commission on Education for the Twenty-first Century, reporting to the United Nations Educational, Scientific and Cultural Organization (UNESCO), emphasized the importance of the growing relationship between lifelong learning and success in the labour market and the workplace. "Given the present and foreseeable advances in science and technology, and the growing importance of knowledge and other intangibles in the production of goods and services, we need to rethink the place of work and its changing status in tomorrow's society. To create tomorrow's society, imagination will have to keep ahead of technological progress in order to avoid further increases in unemployment and social exclusion or inequalities in development."

A recent OECD report also identified lifelong learning as crucial to policies addressing the impact of information technologies on work. According to the OECD, the worlds of learning and work have grown ever more interdependent, and effective action must involve all of society and a deliberate rethinking of traditional roles and responsibilities.

The OECD emphasized that funding for lifelong learning cannot all come from the public purse. What is funded from public sources must be targeted as strategically and effectively as possible. To this end, the OECD underscored the importance for member countries to grasp the full spectrum of issues associated with these changes and then to move quickly to implement new policies. A key outcome of such policies will be improved growth in productivity and increased innovation, which the OECD views as critical to sustaining and raising standards of living.

OECD research suggests that Canada and other advanced economies need to:

- improve their understanding of how human resources management and organizational practices in the workplace can both increase productivity and contribute to an equitable sharing of productivity gains
- identify impediments to the introduction of innovation and durable workplace practices
- identify mechanisms to encourage more widespread adoption of innovative and durable practices, while considering what employers and workers — the principal actors in the workplace — might do differently to foster productivity and improve the quality of working life
- propose and consider how public policy can support these changes.

EMPLOYMENT AND THE CHANGING WORKPLACE

The debate on workplace and employment issues demonstrates the complexity of the Information Highway environment. Until recently, discussions about the impact of technology focussed on changes arising from the growing use of computer systems, networks and desktop computers linked together within a single enterprise. Networks connecting many enterprises were relatively scarce. Today, tens of thousands of networks linking millions of computer hosts are creating an interactive global environment — a network of networks.

This reality adds a new dimension to workplace and employment issues, introducing new challenges and bringing a new layer of complexity. Canadians must understand this reality to identify opportunities for increasing employment and improving 21st century workplaces. However, the very complexity of this reality has fuelled the continuing debate about the impact on employment of the new technology.

Over the past three decades, there has been a shift to higher levels and longer periods of unemployment. At the same time, employment opportunities have changed. Job growth has been strongest for prime-age workers, particularly women, while levels of youth employment still remain below pre-recession peaks. Older male workers and those with the lowest educational attainments have experienced decreasing employment opportunities.

Meanwhile, evidence exists that jobs themselves have become less secure. The proportion of jobs lasting less than six months has increased significantly over the past 15 years. According to HRDC's *1995 Work Arrangements Survey* (Ottawa: Supply and Services Canada, 1996), more than one in ten persons stated their job was less secure. Though small firms have contributed most to job growth and now account for a larger share of total employment, their job creation record masks high turnover rates reflected in large job gains and job losses.

The interpretation of such employment figures is the subject of intense debate. Some attribute the declines to the new technology. Others see a range of other factors as the key causal agents. Thus, intense controversy surrounds the availability of jobs in a knowledge-based economy.

The nature of jobs and the workplace is also changing, raising important issues. These revolve around the emergence of non-standard areas of work (including part-time work, contingent or contract work and telework), an increase in self-employment, and questions about hours of work and the distribution of work (for example, mandatory overtime versus hiring additional workers). Cutting across all these issues are concerns about a possible growing polarization of income and opportunities, as well as the need for more and better education, training and skills development.

Part-time work is now a major feature of Canada's economy. While the percentage of people classified as part-time workers (18.5 percent) has not changed significantly over the past decade, the proportion preferring full-time employment has risen. At issue for organized labour is

the inability of some part-time workers to get full-time work; they are seen as involuntarily engaged in part-time work. Also at issue for both business and labour are pay and benefit levels, access to pensions, variable hours of work and the ability to form or join labour organizations.

The desirability of contingent work, including contract work, is increasingly determined by a person's level of skills. For people with higher skills, contingent work can offer freedom and mobility. For less-skilled workers, the result can be job insecurity. Differences in levels of income and access to paid benefits are also at issue. Self-employment raises similar concerns, and its value to an individual also depends very much on that person's education, training, skill levels and occupation.

Many see telework as very similar to contract work. For people with skills and the opportunity to change jobs, it can offer significant advantages. Others may have no alternative to home-based work. At issue are benefit packages and labour standards for telework, as well as how to inform teleworkers about new and different employment opportunities.

No agreement has been reached on the norms and standards that should govern either hours of work or their wider distribution among people seeking work. One issue here is the sometimes involuntary nature of overtime work. Another is that it is often placed upon people already fully employed, instead of being distributed among marginally employed or unemployed people. No consensus exists on the policy options for addressing this issue, such as work sharing, shortened work weeks or fiscal incentives from governments.

Business and labour members of the Council differed on the impact of technology and the role of governments. We accepted this lack of consensus on most of the issues, and these differences have influenced the conclusions and recommendations that follow in this chapter. In addition to the workplace and employment issues on which the Council was able to identify consensus, Jean-Claude Parrot reiterated that many more still need to be addressed. The minority report issued by Mr. Parrot at the conclusion of Phase I of the Council's work and published as an appendix to *Connection Community Content* outlined these additional issues. Mr. Parrot reiterated his support for the positions developed in this minority report and the need to have the full range of issues addressed by governments.

The Role of Government

One focus of debate at the National Forum was the role governments should play in building a knowledge society. Two central themes were:

- the key leadership role for governments in the transition to a knowledge society by, for example, enabling sectoral councils (or similar bodies) to engage the issues surrounding the introduction of information technology, including the support for and participation of all stakeholders in lifelong learning
- the need for governments to tackle the central issues in education and training, learning and skills accreditation, pension portability and taxation, which flow together during the transition to a knowledge economy.

The Council recognizes that the role of government is changing and that there will likely be fewer resources available to governments in the foreseeable future to address a broad range of social and economic issues. Yet we are convinced that governments do have a major leadership role in modernizing and reforming the critical infrastructures of education, learning, training and health care that have given Canadians their enviable quality of life. Government leadership in applying information and communications technologies will be integral to completion of this modernization in a timely and effective manner.

7.1 Governments, as part of their leadership roles, should:

- a. identify those sectors of the economy where the successful introduction and application of information technology is essential; and*
- b. establish consultative mechanisms, such as sectoral councils representing business, labour and others, to study and resolve key issues related to employment and the workplace.*

To secure jobs in the new economy, Canadians need a new level of flexibility. Timely availability of new learning and training opportunities, especially through the Information Highway, can help, but only if Canadians are in a position to take advantage of it.

This flexibility also involves the ability to move in order to take advantage of employment opportunities. Failure of governments to update and coordinate key employment-related policies in a timely manner can frustrate this ability. These policy areas include education and skills training accreditation, pension portability, taxation levels and labour

standards. More effective intergovernmental coordination would facilitate the interprovincial movement of qualified workers, particularly to fill high technology positions when the required skills are unavailable locally. Thus, a key role for governments should be to coordinate their employment-related policy initiatives to eliminate barriers to labour mobility and employment opportunities.

7.2 The federal government should assume a leadership role in ensuring intergovernmental coordination and policy development with respect to labour standards and job creation.

Modernizing Labour Standards

Adjustments in the workplace to the introduction of information technology can be successful. A number of examples of such adjustments were discussed at a December 1996 international conference in Ottawa organized by HRDC and the OECD Directorate on Technology and Organizational Change/Flexible Enterprise. Some of these examples included the use of collective agreements to anticipate and manage the transition.

In the absence of collective agreements, the Council envisages a continuing role for updated labour standards as mechanisms for dealing with issues around the introduction and impact of information technology on workers. This view was also shared by business and labour representatives attending the National Forum on the Information Highway and Workplace Issues. There were, however, differences in emphasis.

On the one hand, businesses desire greater flexibility in the application of labour standards in the workplace. In a networked environment, work can be performed at different times in different places and under different contractual relationships. Businesses want to reexamine who needs protection and who needs greater flexibility. For example, businesses view the current debate about contingent workers as expressing a need for new definitions on who is an employee, who is an employer and what is a workplace.

On the other hand, labour is concerned about the nature of the employee protections that are put in place as these changes occur. In labour's view, these new protections should include legislated minimum standards applicable to all workers and removal or modification of some current practices that disadvantage people moving into non-standard forms of work.

- 7.3** *Governments should place a greater priority on modernizing labour standards legislation — for example, the current initiative to amend Part III of the Canada Labour Code. This modernization should reflect, to the extent possible, the interests of both business and labour and encompass the new forms of employment and related workplace conditions.*

The Changing Labour Market

Changes in labour markets and the nature of work itself are creating a growing need to identify and match the skills required in the new economy to the anticipated supply of work. A study prepared by the Conference Board of Canada, *Jobs in the Knowledge-based Economy: Information Technology and the Impact on Employment* (Ottawa: Conference Board of Canada, 1996), reveals that information technology can intensify the mismatch in skills between the demand and supply of labour. Many participants in the National Forum also agreed on the need to match skill development — especially computer literacy and numeracy — more effectively with requirements in the labour market.

This problem can be resolved in part by developing the new and enhanced economic measurement tools noted below. Equally important will be more effective sharing by governments of better information and the increased availability of better learning materials for skills development.

- 7.4** *Human Resources Development Canada and provincial/territorial governments should accelerate their efforts to match more effectively skills requirements and anticipated labour market demand. (See also Recs. 3.4, 5.6 and 6.4)*

LIFELONG LEARNING

In *Connection Community Content*, the Council stated that lifelong learning must be a key design feature of the Information Highway. Our views have not changed. Lifelong learning will be essential to individual Canadians in a knowledge economy and society because finding and keeping jobs will depend on access to learning opportunities to upgrade skills and knowledge throughout their lifetimes. The general availability of such opportunities is equally important to industry, which will need a highly skilled, flexible labour force in the knowledge-based economy.

The Information Highway must become an avenue for the delivery of lifelong learning opportunities to Canadians. Indeed, lifelong learning will of necessity involve the effective use of information and communications technologies. However, this very reliance on the new technologies and the emphasis on learning beyond the classroom will continue to raise fundamental policy issues.

Given the small size of the Canadian market, these issues will have to be addressed on a country-wide basis if Canada is to lead in the development and application of learning technologies, including the development of educational software. Currently, Canada lacks a focal point where a broad cross-section of stakeholders can meet to examine and resolve such policy issues.

We therefore believe a serious need exists for an ongoing mechanism to facilitate consultation and discussion across Canada on the use of Information Highway technologies for lifelong learning. Such a mechanism would provide a horizontal link across a broad cross-section of key decision makers to address outstanding issues related to application of information and communications technologies in learning. Such a mechanism would also give key stakeholders a venue to examine and discuss the issues, as well as to propose workable solutions responding to the interests and concerns of governments, educators and learners. In the Council's view, only with such a mechanism in place will it be possible to promote use of the Information Highway effectively as a vehicle for supporting a lifelong learning culture in Canada.

7.5 A mechanism should be established to provide a forum for the discussion of policy issues affecting the use of the Information Highway in support of lifelong learning, and this initiative should tap into a broad cross-section of constituencies with interest and expertise in this field. (See also Rec. 6.15)

Participants in such a forum should include key decision makers from educational institutions (universities, colleges, school boards), provincial governments (ministries of education and ministries responsible for manpower and training), the federal government, the information technology sector, the courseware development industry, commercial training organizations, professional associations, labour and learners.

Such a mechanism would need financial support from governments and key stakeholder organizations, including the private sector. A range of organizations has expressed interest in the concept. These include the Council of Ministers of Education, Canada (CMEC), the Canadian Education Association (CEA), the Association of Canadian Community Colleges (ACCC), the Association of Universities and Colleges of Canada (AUCC), the Canadian Publishers' Council, Open Learning Agency (OLA), IBM Canada, Knowledge Connection Corporation and the Information Technology Association of Canada (ITAC). The CMEC will explore how such an initiative could fit with its overall strategy for information technologies and learning.

7.6 *The Council of Ministers of Education, Canada (CMEC), with the participation of federal departments such as Human Resources Development Canada and Industry Canada and other key stakeholders, should explore further the creation of an ongoing mechanism to facilitate the resolution of policy issues pertaining to technology and learning. Stakeholders should address such questions as the specific objectives, feasibility, financial support and reporting arrangements of the proposed mechanism.*

The effectiveness of such a mechanism would be improved by the development of a network of Canadian stakeholders and organizations representing a wide variety of constituencies interested in life-long learning. Such a forum should also be able to draw on experts to advance its work by identifying the learning needs of particular groups. Governments, national associations and the Office of Learning Technologies at HRDC have already developed many such networks.

THE NEED FOR POLICY RESEARCH AND INFORMED DEBATE

As noted above, business and labour hold differing views about the impact of new technologies upon both employment and the workplace. Not surprisingly, their policy prescriptions for the future also differ. Labour wants strong protections put in place to protect workers. Business wants flexibility in determining the way that work is distributed and how compensation is provided.

Given the changes in employment and unemployment that have already occurred, the Council recognizes that as with all new technologies there may be negative consequences. We need to determine

whether mitigating measures are required, and if so, what they are. The public also expects government to bridge these divergent views and interests and to be responsible for proposing mitigating measures. In support of such a role, it will also be necessary for governments to monitor the impacts of technologies and share that information with business, labour and the public.

7.7 *Governments should conduct further policy research about the impact of new technologies, and join in the ongoing public discussion and debate exploring alternative mechanisms to deal with the possibility that the number and quality of jobs generated may not meet expectations.* (See also Rec. 6.3)

At present, there are serious gaps in the information available on the use and impacts of information technology. This was a key theme at the National Forum on the Information Highway and Workplace Issues.

To the degree Canadians can understand the changes now occurring in the nature of work and the workplace, they will be inclined to accept the new environment and define the role they want governments to play in shaping the knowledge society and economy. Such understanding depends on accurate information being made available in a timely fashion. Current measurement tools provide limited information and not always in a timely fashion. The development of new measurement tools will also allow Canada to benchmark more readily and accurately its transition to a knowledge society. New and better information would also help governments, business and organized labour to work more closely together in developing policies and measures to help mitigate any negative impacts the technology has on the workplace and employment.

7.8 *The federal government should continue its national and international efforts to create useful economic and social indicators. This work should proceed as rapidly as possible.* (See also Rec. 1.1)

In the area of lifelong learning, the sheer number of programs and initiatives in Canada and abroad poses a problem for policy makers and the consultative mechanism proposed in Recs. 7.5 and 7.6. It is difficult to formulate good policy and programs without an understanding of what has been tried elsewhere and whether it has succeeded.

A serious need exists, in short, for an inventory of lifelong learning policy and program initiatives both in Canada and abroad. The Office of Learning Technologies at HRDC has developed several related databases, including one containing 25 000 literature entries on use of

learning technologies and a “Who’s Who” base of Canadian organizations producing and delivering learning technologies. However, both governments and the consultative mechanism proposed above should be able to draw upon the vast range of international experience with policies and programs in this area.

7.9 *The Office of Learning Technologies at Human Resources Development Canada should continue to collect information on national and international policies and programs and to share this information with other stakeholders.*

Chapter 8

GOVERNMENT AS A MODEL USER

In Connection Community Content

(September 1995), we recommended that government set an example as a model user of communications and information technology, thereby catalyzing the development and innovative use of the Information Highway throughout our society and economy.

By setting such a powerful example, government will also help itself perform more effectively its own responsibilities. We envisage rapid and interactive electronic access by citizens to government information, personnel and services. This new responsiveness to Canadian needs will bring more affordable government, as the new technology allows more to be done with less. Accessible, responsive and affordable government is crucial to Canada in a knowledge society and economy.

We were pleased with the weight and variety of the government's response to our Phase I recommendations. One of the four thrusts of the government's Information Highway strategy in *Building the Information Society: Moving Canada into the 21st Century* focussed on government as a model user. The Treasury Board Secretariat (TBS), Public Works and Government Services Canada (PWGSC), Industry Canada and many other federal departments and agencies have acted. However, their progress has revealed new challenges for government.

GOVERNMENT PROGRAMS AND SERVICES

In *Connection Community Content*, we made more than 20 recommendations on how the government might use new information technology to improve services to the public. These addressed the importance of electronic commerce, the notion of single electronic windows for users, the issue of electronic access to government services, the updating of provisions for privacy, security and access to information, and the importance of relying on off-the-shelf proven technology and existing infrastructure.

In government, work has accelerated over the past three years and is already proving its value.

- Ninety-five million payments are now made electronically every year, representing more than half of all payments made by the Receiver General of Canada.
- Ten million people and companies have filed their income taxes electronically since 1993.
- Eight million clearances of customs have taken place through 300 brokers.
- In 1995, Canadians received electronically \$443 million in GST refunds and made electronic payments worth \$188 million.
- Natural Resources Canada has introduced an electronic procurement system that cuts transaction costs by 43 percent.
- Intellidoc, the electronic information service of the Canadian Institute for Scientific and Technological Information (CISTI) now receives 1 500 electronic orders a day.
- Industry Canada's *Strategis* allows Canadian businesses to access via the Internet and explore with a powerful search engine 20 000 electronic documents containing strategic business information.
- The Inter Agency Committee on Geomatics is guiding federal, provincial and territorial governments and the private sector in the creation of a Canadian Geospatial Data Infrastructure that will allow rapid public access to digital maps and data for analysis and decision making.

- HRDC now has in place 6 000 electronic service points for job seekers.

And these examples barely scratch the surface.

The Drive toward Electronic Commerce

Even more important in the long term will be the federal government's commitment to electronic commerce — a key means of unleashing the enabling effect of the Information Highway in government and in the Canadian economy as a whole. We applaud the TBS 1996 decision that by 1998 electronic commerce will be the preferred means for the government to conduct its business. In keeping with one of our Phase I recommendations, setting a firm deadline while allowing flexibility in its attainment seems prudent.

As noted in Chapters 3 and 6 in this report, legal obstacles remain to the full institution of electronic commerce within government or the Canadian economy as a whole. However, some progress has been made. In March 1996, the government introduced amendments to the *Criminal Code* to address various kinds of computer crime. The Electronic Commerce Secretariat at Justice Canada is surveying existing federal statutes to determine the types of impediments to electronic filing as a basis for developing legislative options. The Minister of Justice has proposed legislation by the year 2000, providing for the protection of personal data held by the private sector. Remaining legal and legislative obstacles to electronic commerce should be eliminated.

One essential basis for electronic commerce is a public key infrastructure (PKI) to support privacy, the integrity of messages, authentication and non-repudiation. By late 1998, the federal government should have in place a PKI. We note that in 1996, PWGSC introduced government-wide electronic security services such as key management and electronic authorization and identification. These services are the foundation for the use of digital signatures, a key piece in the electronic commerce puzzle.

Building Single Windows

For Canadians to take advantage of electronic commerce in their government dealings or to find easily the services and information they need, government's virtual image in cyberspace must be seamless and transparent. In *Connection Community Content*, we urged the federal government to accelerate its move toward single windows for electronic services and information.

In December 1996, PWGSC established its bilingual Canada Site on the Internet. This provides just a single window for Internet users. A new electronic government directory accessible through this site adds to its utility and responds to another of our earlier recommendations. PWGSC is also integrating the Canada Site, the Publiservice Intranet Site (for sharing information within the public service) and the Reference Canada call centre services (through which Canadians get information over the phone). The Canada and Publiservice sites now receive 45 000 and 14 000 hits a day, respectively. Reference Canada handles 1.2 million calls a year.

Though the Canada Site and other federal sites have direct links to provincial sites, Canadians are still far from having a single window through which they can access all levels of government — federal, provincial/territorial and municipal. The closest approximation is the InterGov Site on the Internet, which provides a catalogue of on-line services provided by the federal government and participating provincial/territorial and municipal governments. We stress that a single window for all government services is achievable and necessary.

Linguistic Duality in Cyberspace

The federal government, with its obligations under the *Official Languages Act*, is required to reflect Canada's linguistic duality in its activities and communications and to provide services in both official languages. Treasury Board has developed Internet guidelines for federal institutions, covering use of official languages. In April 1997, Treasury Board developed a policy on the use of official languages on electronic networks, including the Internet. However, a special study, *Use of the Internet by Twenty Federal Institutions*, by the Commissioner of Official Languages (Ottawa: Supply and Services Canada, December 1996) found that, though the government had made significant progress, "There are a number of language difficulties that confront members of the public and public servants visiting federal Web sites."

The report made a number of recommendations to ensure:

- the development of software in both official languages
- the setting of federal standards for electronic messaging media
- quality control on bilingual federal Web sites, as well as the availability of automated support and local search engines for users in both official languages
- the availability of Internet and other software in both official languages in keeping with *Official Languages Act* provisions regarding language of work
- respect for official-languages policies for the planning, creation and implementation of federal Web sites.

The Council agrees in principle with the thrust of these recommendations. As noted in Chapter 5, we further propose that the government reinforce its role as a model user of information technologies and software that reflect Canada's linguistic duality and thereby contribute to the development of a critical mass of French-language products and services on Canada's Information Highway — an objective already endorsed by Canadian Information Highway ministers at their meeting in September 1996.

Access to Government Services and Information

The Internet now has become a major vehicle for promoting electronic access to government services and information. Although many Canadians use the network at work or school, only 13.3 percent of Canadian households access the Internet, according to the late 1996 Nielsen survey described in Chapter 3.

SchoolNet and the Community Access Program (CAP) of Industry Canada are improving this situation by making the Internet available through public access sites. We applaud the February 1997 Budget decision to inject another \$30 million into CAP over three years so that it can facilitate creation of public access sites in 5 000 rural and remote communities by 2000. We also encourage the decision to proceed with pilot projects for CAP sites in urban neighbourhoods. The *modus operandi* of the program — a joint federal-provincial/territorial effort, in partnership with industry, to animate action at the municipal and community level — reflects our earlier emphasis on having

government promote and use strategic partnerships with communities, clients and other potential information providers. Concern remains about financial viability of these sites.

Across the country, HRDC operates 2 800 job bank kiosks and 2 300 multimedia kiosks capable of providing a range of services.

The move to electronic provision of services and information may or may not result in cost savings for government. However, unless Internet use rises astronomically or unless financially viable public access sites can be found at every street corner, it is difficult to see how the government can move toward providing services and information exclusively in electronic format. There will therefore be a continuing need for hard copy, telephones and the postal system to reach and serve people without computers or Internet access.

The issue is important to a national strategy for Information Highway access. In the interim, the government should consider reimbursing financially stressed public access sites and community networks that make government information and services available to their users.

GOVERNMENT OPERATIONS AND COORDINATION

In September 1995, we made a number of recommendations for internal changes to government and for intergovernmental coordination to hasten electronic delivery of services and information. We are pleased that many have been acted upon.

Internal Operations

For example, we recommended that the government adopt a mission statement to become a world leader in the introduction of information technology as well as electronic information and communications systems and to give all Canadians an opportunity to interact electronically with government. In *Building the Information Society: Moving Canada into the 21st Century*, the President of the Treasury Board and the Minister of Public Works and Government Services — the ministers most responsible for making that vision a reality — confirmed the government's commitment to act as a model user of information technology.

Another key recommendation was that the federal government should have a Chief Information Officer. That post in TBS was filled in March 1997. We believe, by setting policies, regulations, standards and guidelines, by investments, by its authority to approve budgets and by expecting departments and agencies to incorporate electronic commerce initiatives into their business plans, TBS is significantly contributing to the implementation of the Information Highway within the Government of Canada.

The growing emphasis on horizontal models for delivering electronic services is a promising development. By looking at the common needs of certain kinds of clients across departments, as opposed to viewing electronic service delivery solely in terms of departmental jurisdictions, government becomes both more efficient and more responsive to the public. In this respect, the work and projects of the Treasury Board Information Management Subcommittee (TIMS) — a committee of deputy ministers — is especially valuable. These enterprisewide approaches should result in significant economies of scale and should lay a firmer basis for a seamless and transparent interface with Canadians.

The Role of Procurement

A number of our September 1995 recommendations addressed the need for government to use procurement strategically to catalyze the development of Canada's information and communications industries. The National Electronic Government Tendering Service provides a single electronic window for information on government contracts, thereby opening the procurement process to companies across the country. As already noted, the substantial savings in transaction costs provided by the electronic procurement model of Natural Resources Canada indicates that this approach may well be worth emulating across government. Already the Department of National Defence and Agriculture and Agri-Food Canada are using credit cards for procurement and invoicing.

Most promising are indications of a growing shift away from in-house development and in-house procurement of information technology. Increasingly, as we recommended in September 1995, government is relying on off-the-shelf software and commercial systems, as opposed to trying to reinvent the wheel. Indeed, there is evidence of considerable creative thinking and action in consultation with industry around

the notion of defining the necessary “core competencies” of government in the information technology field and looking to the private sector to provide, not only equipment, software, systems and telecommunications services, but also electronic information and services. This trend should be accelerated. As called for in Recs. 5.19 and 5.20, we also urge the government to use procurement — in light of French-language requirements under official languages policies — to contribute to the development of a critical mass of French-language products and services.

The Coordination Imperative

As we noted earlier, it will not be enough if the federal government pursues these initiatives by itself. All governments in Canada should coordinate their activities to provide Canadians with seamless access to single electronic windows on government in Canada.

We are delighted that the governments of New Brunswick, Ontario and Alberta now are conducting pilot trials using the federal government’s Government Enterprise Network (GENET), and are laying the basis for a single window for federal, provincial and potentially municipal information. Under the Community Access Program, the federal and New Brunswick governments have signed a memorandum of understanding to make information from both governments available at more than 200 access points in the province. Another very promising development is Canadian Governments On-Line (CGOL), a joint project of federal, provincial, territorial and some municipal governments to make available on the InterGov Site an electronic catalogue of on-line government services.

An important initiative occurred at the September 1996 meeting of federal, provincial and territorial ministers responsible for the Information Highway. There, ministers asked officials to develop proposals for joint electronic delivery of government services.²⁰ These will be considered by ministers at their next meeting expected later in 1997. We look forward to the results. We urge all governments in Canada to coordinate further their efforts to provide Canadians with one-stop shopping for government information and services.

²⁰ Before taking a position on the joint delivery of government services, Quebec wanted to finalize and adopt its own strategy in this area. Quebec did agree to proposals concerning access, electronic commerce protection of personal information in the marketplace and continuing collaboration.

FUTURE DIRECTIONS

Our message to the federal government is simple. We are impressed by how far government has moved in such a short time. We urge even greater haste. Government must move quickly and aggressively to become a model user of information technology — and not simply because of the ensuing gains in accessibility, responsiveness and affordability, though these will be substantial. What is really at stake here is the continued relevance and legitimacy of government in the emerging information society and knowledge-based economy.

We are encouraged by the government's progress on single electronic windows to access government information and services. The bilingual Canada Site is a significant accomplishment. However, the Commissioner of Official Languages has pointed to a number of linguistic difficulties with the government's Internet use. These should be rectified. In addition, for one-stop electronic shopping to become a reality, Canadians should have single windows through which to access information and services from all levels of government — federal, provincial/territorial and municipal. Governments have taken promising first steps to achieve the required level of coordination. We urge them to follow through, making this vision a reality.

- 8.1 *All governments in Canada — federal, provincial/territorial and municipal — should move urgently to provide single electronic windows for access to government services and information. As a key first step, federal and provincial/territorial governments should, through the Community Access Program, sign memoranda of understanding to establish public access sites in communities and neighbourhoods across the country, as has already happened in New Brunswick.***

Access questions may well limit how far governments can move toward the electronic provision of services and information. Unless Internet use reaches universal levels or unless financially viable public access sites can be found at every street corner, governments will — in addition to making their services available in electronic formats — continue relying on hard copy, telephones and the postal system to reach and serve people without computers or Internet access. The issue

is important to a national strategy for Information Highway access. We see public access sites and community networks as key instruments in overcoming this problem.

- 8.2** *Governments should accelerate their electronic delivery of information and services to the public through the use of community access sites and should compensate community networks accordingly.*
(See Rec. 4.12)

Chapter 9

CONCLUSION: THE ROAD TO THE FUTURE

As the 21st century dawns, Canada and the world are making a profound transition that reaches into every aspect of human life. A new knowledge society is replacing the industrial society that prevailed in the developed world during most of the 19th and 20th centuries.

This transformation is fundamental, and our success in making this transition will determine our success as a nation and as individuals in the 21st century. It will determine whether we as a people can achieve those economic, social and cultural goals that make us Canadian.

It is urgent that Canada move quickly and wisely to accelerate that transition.

This conviction animated the Council's work when it began three years ago. Now, as it ends, this conviction remains our central conclusion.

Canada has made enormous progress in building the Information Highway over the past five years. This report bears witness to much of that activity. Annex C outlines the many actions taken by government in response to our first set of recommendations and identifies where action is required.

While much has been accomplished, much needs to be done — and urgently. The cross-national data in Annex B demonstrate that Canada retains its leadership position in developing the Information Highway and progressing toward a knowledge society and economy. But our major trading partners are challenging that primacy. If they succeed, Canadians will not achieve in the 21st century the goals that they have traditionally cherished.

Nor will Canada realize the full promise of the knowledge society.

THE PROMISE OF A KNOWLEDGE SOCIETY

The knowledge society does not yet exist. It remains a vision flowing out of the potential for good in the information and communications technologies now transforming the world. As with any technology, there are no guarantees that effects will be positive. The end result depends on the people who use that technology, who employ their will, their passion, their ingenuity and their moral imagination to shape its use.

We believe the knowledge society can be a place where all Canadians will like to live and work — but only if its evolution is shaped in light of Canadian goals and values.

The promise is apparent in what most observers see as the greatest impacts of the new technologies. Physical distance will disappear as a factor in human relations, and consequently the world will become a much smaller place. The creation, manipulation and sharing of information and knowledge will become an overriding human imperative.

The significance of these changes is far-reaching. No longer will distance pose an obstacle to economic development, social intercourse, learning, voluntary action, adequate health care, business success or full participation in society and Canada's national cultural dialogue. Knowledge will become increasingly available to everyone, allowing everyone to make wiser decisions in all aspects of our lives — from business to government to health care to education to work to our everyday existence. Everyone will be not just a consumer of knowledge and content, but a creator; and Canada's national cultural dialogue and political discussion will take on a liveliness and depth that will strengthen our national, regional and local communities.

The potential is limitless, but the challenge is real. Canada can transform this promise into reality — but only if everyone can respond wisely and quickly to the new imperatives. These flow directly from the strategic objectives for the Information Highway set out by the federal government when we began work three years ago. These were:

- creating jobs through innovation and investment in Canada
- reinforcing Canadian sovereignty and cultural identity
- ensuring universal access at reasonable cost.

THE ECONOMIC IMPERATIVE

The infrastructure for this new society is, of course, the communications and computer networks that will carry the information, knowledge and intelligence that will be its lifeblood.

As noted in Chapter 2, we strongly support the many initiatives that have established in Canada one of the world's most progressive and forward-looking policy and regulatory regimes for the Information Highway. This work must be completed, and technology-neutrality must be enshrined as the central principle of policy and regulation for the Information Highway, so that no obstacle remains to using the best technology for a given application or purpose. Now that a fully competitive environment is almost in place, both government and private sector must commit themselves to building the high-quality, affordable information infrastructure needed to strengthen Canada's position in the global information economy. This task takes on growing urgency with the evidence that Canada trails some countries in per capita spending on information and communications technology.

But an information infrastructure will contribute to economic growth and job creation only if Canadian businesses, large and small, are in a position to use it to the full. As emphasized in Chapters 3 and 6, the development of electronic commerce and new commercial content and information services are critical to forming a true knowledge economy and capturing the Information Highway's enabling effects. Canada must move quickly to lay a solid legal and technical foundation for electronic commerce and for the new services and content that will be the lifeblood of the knowledge economy.

THE CONTENT IMPERATIVE

We urge the federal government to develop, before the end of 1997, in consultation with the private sector, a stronger, broader and more integrated plan to ensure the availability of a wider range of quality Canadian content reflecting Canada's distinctive cultural realities and linguistic duality. Such a plan should place priority on promoting cultural content which expresses and reflects Canadian experience and identity.

If Canada is to survive and flourish, the Information Highway must make room for Canada's distinctive cultural reality in both English and French. The creation, distribution and production of Canadian content is an important source of jobs and economic growth and a foundation

for the national cultural dialogue holding us together as a country. The economic possibilities flowing out of the Information Highway represent a cultural opportunity for a stronger articulation of Canadian visions and a reinforcement of our national, regional and local communities. This opportunity must not be lost.

THE ACCESS IMPERATIVE

We also urge the government to meet its commitment to articulate, before the end of 1997, a national access strategy that will:

- ensure Canadians affordable access to basic telecommunications and broadcasting services
- promote access to new Information Highway services and networks such as the Internet
- establish a formal mechanism for advising on access and universality in the knowledge society of the future.

Canadians will not be able to participate in a knowledge society unless they are in a position to use the Information Highway. For this reason, access to the Information Highway is crucial to Canada's future as a knowledge society and to its success as a knowledge economy. Without access, the longer-term effectiveness of policy frameworks for the Information Highway is questionable. Moreover, without access, the economic, social and cultural benefits of the Information Highway for Canadians may well prove to be illusory.

In Chapter 4, we set out detailed recommendations for a national access strategy.

THE LEADERSHIP IMPERATIVE

Council proposals throughout this report indicate directions and possibilities for government and the Canadian public. They are not final, definitive statements on matters that are and will remain for the foreseeable future sensitive and complex public policy questions. But they do express realistic and honest expectations of what governments and public leadership should produce if Canadians are to continue enjoying an economy and society that are among the best in the world.

We welcome the leadership shown within the federal government in steering a course for Canada and Canadians toward the 21st century. We welcome also the commitments of provincial governments, the

private sector and individual citizens to follow this course. We hope that our work has made an important contribution to these collective efforts, and to the future well-being of Canadians.

Over the past three years, we have served as a catalyst for Information Highway initiatives. As we end our work, we believe future progress on some specific issues requires some body or bodies to perform an ongoing monitoring, catalytic or advisory role. Some of the most important issues are:

- advanced networks — infrastructure and applications development encouraging private and public sector partnerships that would further the roll-out of advanced networking and related applications development
- Canadian content — developing and implementing a stronger, broader and more integrated strategy to reinvigorate the cultural dialogue essential to Canadian unity
- access — providing dialogue and advice to government on the changing nature of universal access in an information society, including the definition of essential services.
- lifelong learning — providing a forum for governments, educators and the technology community to consider issues whose resolution is necessary to making lifelong learning “a key design element of the Information Highway”
- standards — promoting the development, diffusion and adoption of standards for open networks and connectivity and continuously charting the “standards road map for the Information Highway”
- government as a model user — encouraging government departments and agencies to become model users of the Information Highway, both for internal administration and for the delivery of services to the public
- performance indicators — defining and measuring the key economic and social indicators of Canada’s progress as a knowledge society, and providing for appropriate benchmarking against international developments.

We believe it is equally important to consider how to foster accountability within the public and private sectors for carrying forward tasks critical to the continued development of the Information Highway. In closing out our activities, we have formally approached key organizations in the public and private sectors, requesting them to continue work on Canada’s agenda for the Information Highway. Their response has been uniformly positive and their roles in implementing the Information Highway for Canada have been outlined earlier.

We believe a formal mechanism is necessary to review performance and to assess Canada's overall progress in developing a knowledge economy and society. Such a comprehensive review should be conducted on a regular basis. The resulting "progress report" should be made public and should be based on the key indicators and other empirical measures used to benchmark Canada against developments internationally. Because federal, provincial and territorial ministers responsible for the Information Highway have agreed to meet regularly, this reporting process could be tied to this forum, with a specific date fixed for compilation of the next report — say, no later than December 31, 1998.

9.1 The federal minister responsible for the Information Highway, in concert with his/her provincial and territorial counterparts, should undertake the task of establishing a formal mechanism to review performance and to assess Canada's overall progress in developing a knowledge economy and an information society.

We hope Canadians' willingness to leading in building a knowledge-based economy and society will not flag in the coming years. The profound social, economic and cultural transformation that Canadians now are experiencing is neither the invention nor the exclusive business of the Information Highway Advisory Council. It is everybody's business.

Governments, industry, voluntary associations, community groups and individual Canadians all have roles as drivers on the Information Highway in making the knowledge society of the 21st century a place that reflects Canadian goals, aspirations, and values. We must make the future, or it will make us. Carpe Diem!

Annex A

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Annex B

KEY INDICATORS FOR BENCHMARKING THE DEVELOPMENT OF CANADA'S INFORMATION HIGHWAY

by Max E. Melnyk

INTRODUCTION

The emergence of a knowledge economy and society underscores the need to develop statistical indicators allowing measurement of Canada's progress in comparison with other countries. Such benchmarks can provide both governments and companies with an assessment of the effectiveness of policies and strategies in facilitating this transition.

Despite cooperative endeavours at international fora such as the Organisation for Economic Co-operation and Development (OECD) and individual efforts by many countries — including Canada — work on such key indicators is still in its early stages. One obstacle is the absence of agreement on the characteristics of the new economy and society and thus on what indicators might reflect progress. Cross-national comparisons also pose difficulties because data are not always comparable between jurisdictions. For this reason, the study of key indicators for a knowledge economy and society on a cross-national basis is still in a rudimentary state of development. This annex provides a preliminary exploration of a few of the key indicators that are available.

The key indicators relate to the general economic situation, government policies and regulations, supply, demand and employment. These are further divided into a primary set of key indicators: gross domestic product (GDP), competitiveness, competition/deregulation, investment, modernization, pricing, overall technology penetration and employment.

Figure B-1 outlines the proposed key indicators that could be used to assess the status and evolution of the information economy. Further details on these key indicators and their components are provided later in this report.

Figure B-1
Conceptual Framework of Key Indicators
and Components of the Canadian
Information Infrastructure

I. General economic situation	
• knowledge-based economy	
• information economy	
II. Government policies and regulations related to Information Highway infrastructure indicators ^a	
III. Information economy	
A. Supply	B. Demand
Investments	Penetration rates and usage
	– households and others
	(business/government)
Network modernization	Technology diffusion
Pricing	Price sensitivity
Subsidies	– consumer price indices
Interconnect charges	– business price indices
Employment	

^a See Government of Canada, *Measuring the Global Information Infrastructure for a Global Information Society: Concepts and Performance Indicators*, submission to the OECD Committee for Information, Computer and Communication Policy, September 1996.

Source: Max Melnyk & Associates, 1997.

INFORMATION INFRASTRUCTURE DEFINITIONS

Melody¹ identifies the specific components of the information infrastructure in the development of information society policies as consisting of the telecommunications facility system, information content and value-added communications services, equipment sector, skills and policies. A recent government report defining the information economy for measurement purposes includes the information and communication technologies (ICT) as well as the arts and culture industries.²

As an initial step, the information infrastructure can be considered as consisting of the telecommunications networks — a collection of telecommunications mediums or technologies, services, features and capabilities available to users — and technologies and services (software and hardware) — which allow the delivery of information services.

Table B-1 shows an initial detailed list of potential key indicators and their components, while Table B-2 provides an initial assessment of where these statistics may be sourced and some indication of the nature of the extent of the data available; that is, by specific country or by years for Canada. The primary set of proposed key indicators includes the following: gross domestic product, competitiveness, competition/deregulation, investment, modernization, pricing, overall technology penetration and information infrastructure employment. The following provides the rationale for selecting these key indicators and also Canada's relative performance in these areas.

¹ William H. Melody, "Toward a framework for designing information society policies," *Telecommunications Policy* 20 (4): 243–59.

² Government of Canada, *Measuring the Global Information Infrastructure for a Global Information Society: Concepts and Performance Indicators*, submission to the OECD Committee for Information, Computer and Communication Policy, September 1996.

Table B-1
Detailed List of Key Indicators
and Components of the Canadian
Information Infrastructure

Indicator	Components
General economic situation	GDP Telecommunications services share Information industries share Trade imbalance Inflation rates Competitiveness Research and development
Government policies and regulation	Deregulation* Competition* Trade* Content requirements*
Supply	Capital expenditures Modernization of network/ new products and services Network lines (residential and business) Access lines Multi-party Cellular Paging/wireless ISDN Television/radio Multimedia access Productivity Revenue/profits/ROE Consumer price index Subsidies Interconnect charges

Table B-1 (cont'd)
Detailed List of Key Indicators
and Components of the Canadian
Information Infrastructure

Indicator	Components
Demand	Penetration rates (households) Telephones Cable/TV/radio PCS/modems Fax Internet/providers Satellite Cellular/wireless Software Penetration rates (business) Services/hardware* Penetration rates (educational/others) Services/hardware* Price Sensitivity Telephone/cable charges Competitive services* Technology diffusion Telephone lines Cable TV Digitization
Employment	Education expenditures Human resources skills and training Growth of service sector employment Unemployment rates
* Not necessarily available on a comparative basis or for international benchmarking.	

Table B-2
Sources of Statistics

Indicator and components	Sources
General economic situation	
GDP	
Telecommunications services share	Canada by Years — Stats Canada
Information industries share	Canada by Years — Stats Canada
Trade imbalance (export/imports)	Canada by Years — Stats Canada
Inflation rates	Countries — OECD 1991
Competitiveness	Countries — OECD, G-7, Dept. of Finance Report 1993
Research and development	Countries — OECD
Government policies and regulation	
Deregulation	Countries — Industry Canada, CRTC
Competition	Countries — Industry Canada, CRTC
Trade liberalization	Countries — Industry Canada, Foreign Affairs
Content requirements	Countries — Heritage, Industry, CRTC
Supply	
Capital expenditures	Canada — Industry Canada, Stats Canada, Carriers Countries — NTIA Infrastructure Report 1991
Modernization of network	
Network lines/access lines (residential and business)	Canada — Industry Canada Countries — AT&T: The World's Telephones, ITU, <i>World Telecommunication Development Report 1994</i>
Multi-party	Canada — Industry Canada, CRTC
Cellular	Canada — Industry Canada Countries — OECD
Paging/wireless	Canada — Industry Canada
ISDN	Canada — Industry Canada Countries — OECD

Table B-2 (cont'd)
Sources of Statistics

Indicator and components	Sources
Television/radio	Canada — Industry Canada Countries — Heritage, Industry Canada
Multimedia access	Countries — ITU
Productivity	Countries — OECD 1990
Revenue/profits/ROE	Canada — CRTC
Consumer price index	Canada — Stats Canada
Subsidies	Canada — Industry Canada, CRTC
Interconnect charges	Canada — Industry Canada, CRTC
Demand	
Penetration rates (households)	Canada — Industry Canada, CRTC Countries — ITU, OECD, IDC Report
Penetration rates (business)	Canada — Industry Canada
Penetration rates (educational/other)	Canada — Industry Canada
Price sensitivity	
Telephone/cable charges	Canada — Industry Canada, CRTC Countries — OECD
Competitive services	Canada — Industry Canada, CRTC Countries — OECD
Technology diffusion	Countries — OECD, AT&T, ITU
Employment	
Education expenditures	Countries — UNDP Human Development Report
Human resources skills and training	Countries — World Competitiveness Report
Growth of service sector employment	Canada — Stats Canada
Unemployment rates	Canada — Stats Canada Countries — IMF

THE CONCEPT OF KEY INDICATORS

Key indicators are seen as a means of measurement of a group of fundamental values that, taken together, provide an indication of the item being measured (such as the health of the economy, social well-being, etc.). In order to be relevant and indicative of a trend as well as to provide a comfortable level of validity, they must be measurable consistently over time and they must be measured using the same parameters each and every time.

National and international benchmarking have become important for planning future scenarios and public policy making (such as trade liberalization and competitiveness impacts) and to monitor trends and progress toward the achievement of goals and objectives. There is a trend internationally, with Canada as the prime architect, to modernize the statistical accounts and measurement, to assist in the analysis of information infrastructure developments.

The gathering of statistical data with respect to an information infrastructure has become more complicated today in a liberalized and competitive environment because of the elements of confidentiality in the data. In addition, in some instances, the data in the development of the key indicators are provided by different sources; the variety of the sources could include a government agency, government departments, private industry, statistics-gathering organizations, research companies, consulting firms, international organizations, etc. In many cases, their efforts are not coordinated.

Even though the OECD, International Telecommunication Union (ITU) and others³ have acknowledged the difficulty of collecting and harmonizing a set of internationally comparable indicators for telecommunications, there is still an impetus and general intent to work toward a set of key indicators that are useful in specifying the evolution and development of the information infrastructure. This becomes even more difficult with an expansion beyond telecommunications, but a complete set of indicators, as proposed in this paper, should provide a general comparison of information infrastructure developments worldwide.

³ For example, see OECD, *Communications Outlooks and Information Technology Outlooks* (Paris: OECD, annual); and International Telecommunication Union.

Kahin and Wilson⁴ indicate that infrastructure comparisons can be made as long as there are some clarifications and specifications of the what, when, where and why of the information infrastructure initiatives in each specific country. In his recent book, comparisons of initiatives have been suggested in the following areas: technical systems (design, distribution and uses of the hardware and the software systems that comprise the national “networks of networks”), the sectors of the economy (domestic markets), government policy (generic policy issues and industry-specific policy issues), institutional structures (interlocking system of institutions), subnational groups and individuals (self-interest groups) and culture, communications and media.

Key indicators can also be used to produce indices that can provide a one-time snapshot, track a parameter over a period of time, which is similar to most economic and social indicators used for country-to-country comparison, or measure some aspect of the development of a nation. Some of these include previous work done by the ITU, OECD and others; that is, indices that bear names such as teledensity, telegeography, telecompetitiveness, competitiveness, information imperative index, etc.

KEY INDICATORS AND COMPONENTS

Further elaboration of the key indicators and components in Figure B-1 are provided as follows.

General Economic Situation

The intent is to measure the overall social and economic health of the country; that is, the country’s standard of living in terms of the population being able to afford services. For example, if Canada has a high standard of living as measured by the United Nations Human Development Programme, this should be factored into the indicators. Other elements could relate to trade (import/export of products) and research and development (the ongoing development of new products) and overall world competitiveness as measured by a number of international organizations. As a minimum, some aspects of GDP and competitiveness would be needed. (Two important new concepts include the knowledge-based economy and the information economy.)

⁴ Brian Kahin and Ernest J. Wilson III, editors, *National Information Infrastructure Initiatives* (Cambridge, Mass.: MIT Press, 1997).

Government Policies and Regulation

This relates to general government policies and regulatory activities that are aimed at providing a wide range of products and services at competitive prices, with an information infrastructure capable of delivering these to the consumer. There could be elements of international trade in services and content rules. As a minimum, a competition/deregulation indicator encompassing most of these elements would be needed. (Of specific interest would be a list of the key government policies and legislation that promote the information economy. More specifically, what, if any, barriers can be eliminated to promote economic growth?)

Supply

On the supply side, it is important to determine the overall investment (capital) to allow for the growth in networks, products and services, modernization of the infrastructure (digitization, broadband services, advanced networks, etc.) and prices charged (whether subsidized or not). This should provide an indication of a high-quality information infrastructure offering excellent service to most of the population. As a minimum, an investment indicator would be needed, one related to modernization and one for pricing.

Demand

On the demand side, attention would be directed to the penetration and usage of technologies by population; that is, households, businesses and governments. There has been considerable effort in this regard internationally, and this is one area that really identifies the takeup and potential use of information and communications technologies (ICT) in the country. As a minimum, an overall technology penetration indicator is needed, with possibly some relationship to price sensitivity and technology development. (Demands are related to the price of the ICT services and products. However, this is also dependent upon income and time available to the consumer for information and communications technologies. Other factors are also important.⁵ More research is required in this area.)

⁵ See, for example, Paul T. Dickinson, *Access to the Information Highway: Canadian Households*, a report prepared for Industry Canada, Spring 1996, pp. ii, iii.

Employment

Employment is a key indicator that has been widely accepted over a long period of time as an element for the comparison of national economies. This area needs some means of tracking the creation and shifting of employment related to information infrastructure developments, not simply statistics on unemployment. At a minimum, an employment indicator is required. (New research in this area has already commenced.)

The primary set of proposed key indicators would include the following:

- gross domestic product
- competitiveness
- competition/deregulation
- investment
- modernization
- pricing
- overall technology penetration
- employment

With a minimum subset of two components for each indicator, the result could include a range of eight to 16 indicators, which would then be used for information infrastructure measurement and benchmarking. These are described below.

KEY INDICATOR SUBSETS

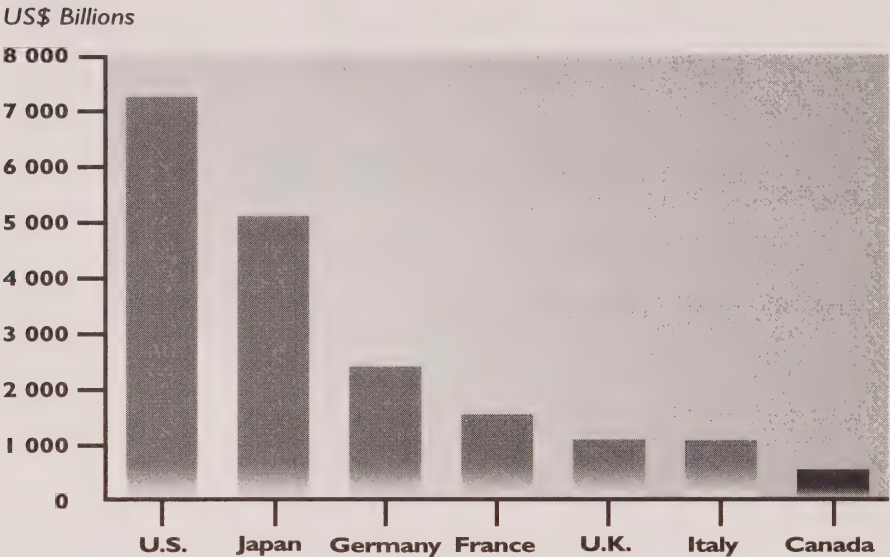
Under each of the specific key indicators, subsets would provide the substantiation for the key indicator and further precision as a measurement of the status and evolution of the information infrastructure.

General Economic Situation

Gross Domestic Product

Gross domestic product (GDP) is the total value of goods and services produced in the economy, as measured according to statistical measures of national accounts. There have been two methods to measure the relationships between various countries, total GDP (Figure B-2) and per capita GDP (Figure B-3).

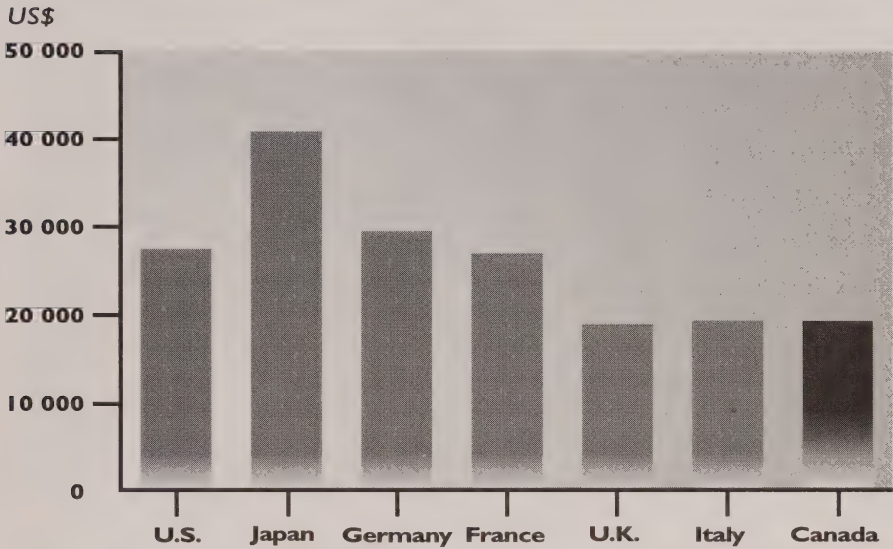
Figure B-2
Total Gross Domestic Product by
Country, 1995



Source: Data provided by the World Economic Forum, 1996.

For an international comparison and perspective, it would be useful to have an indicator of the share of the information and communications technologies (ICT) of the GDP and growth in each of the countries indicated.

Figure B-3
Per Capita Gross Domestic Product, 1995

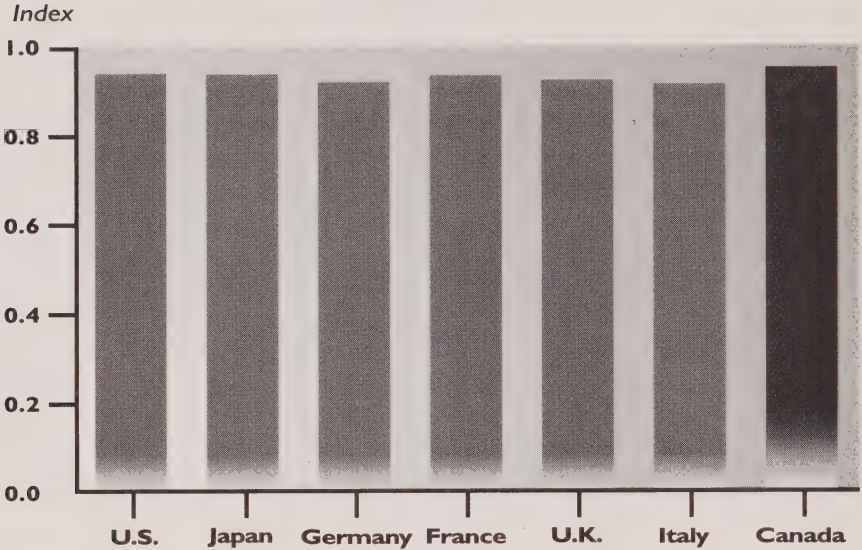


Source: Data provided by the World Economic Forum, 1996.

Human Development Index

An additional element of the general economic situation should include the measure of standard of living, as provided by the United Nations Development Programme (UNDP, *Human Development Report*, New York, Oxford University Press, annual). This provides a strong indication of the social and economic status of the various countries (Figure B-4).

Figure B-4
Human Development Index, 1996



Source: Data provided by the United Nations Development Programme, 1996.

Competitiveness

Under competitiveness, consideration should be given to overall competitiveness, as measured by international organizations, as well as elements related to trade, inflation, and research and development.

Overall Competitiveness

The International Institute for Management Development (IMD) *World Competitiveness Yearbook* (City: IMD, March 1997) defines competitiveness as "the ability to create added value and thus increase national wealth by managing assets and processes, attractiveness and aggressiveness, globality and proximity, and by integrating these relationships into an economic and social model." According to the IMD, the scoreboard among the countries of interest is as follows:

Country	Ranking
United States	First
Canada	Ninth
Japan	Eleventh
United Kingdom	Twelfth
Germany	Fourteenth
France	Twentieth
Italy	Thirty Fifth

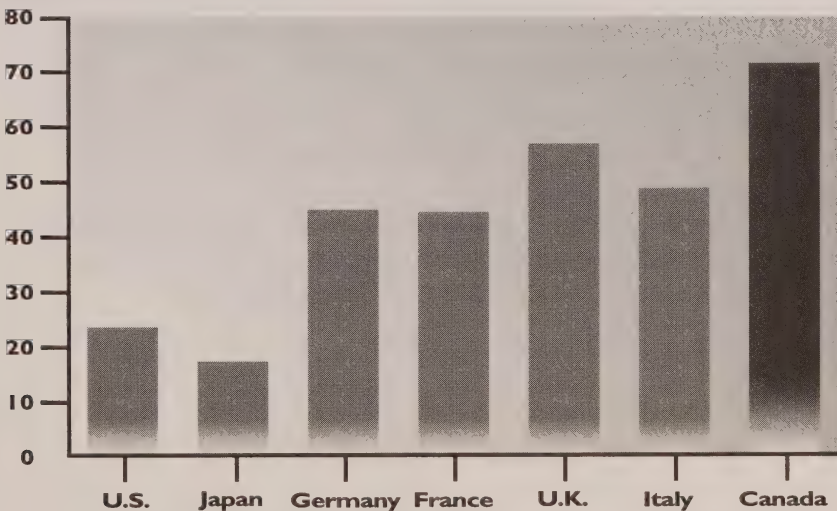
Source: International Institute for Management Development, *World Competitiveness Yearbook*, annual.

Trade

Overall trade figures take into account the exports and imports (goods and services). Breakdowns are available within Canada for the ICT sectors and internationally for specific elements (telecommunications equipment, broadcasting equipment, computer equipment). Trade data will require extensive review to ensure comparability among nations (Figure B-5).

Figure B-5
Trade in Goods and Services, 1995

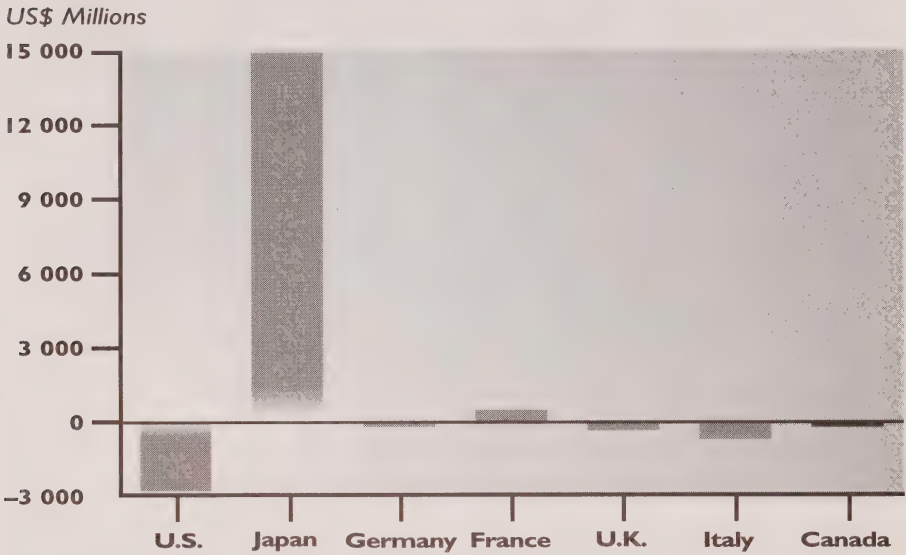
Share of GDP (%)



Source: Data provided by the Organisation for Economic Co-operation and Development.

The ITU and the OECD provide data on specific equipment areas (Figure B-6).

Figure B-6
Telecommunications Equipment Trade:
Exports Minus Imports, 1993

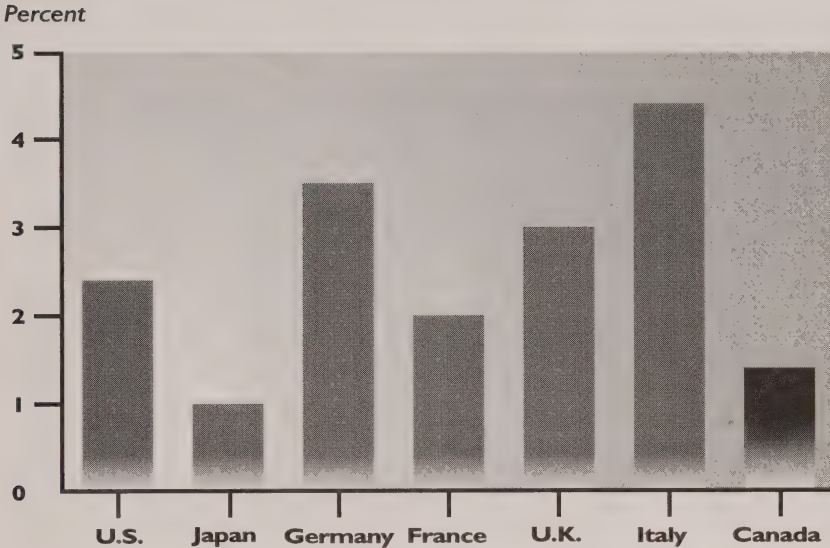


Source: International Telecommunication Union, *World Telecommunication Development Report* (Geneva: ITU, 1994).

Inflation Rates

Inflation rates provide an indication of the value of money available in the economy over time. Some statistics are available for the Group of Seven (G-7) major developed countries (Figure B-7).

Figure B-7
Inflation Rates, 1992-95 Average



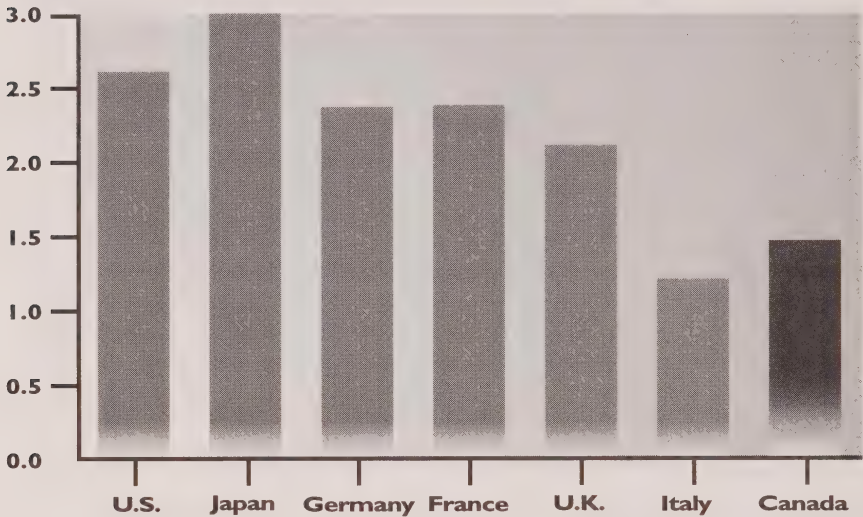
Source: Data provided by the Organisation for Economic Co-operation and Development.

Research and Development

Research and development (R&D) spending provides an indication of the innovativeness of the various sectors of the economy. Statistical data are available on overall spending on R&D (Figure B-8), but more specific data are required on ICT R&D as a proportion of the total in each of the countries of interest.

Figure B-8
Spending on Research and Development,
1993

Share of GDP (%)



Source: Data provided by the World Economic Forum, 1996.

Based on the above subsets, an indication of the general economic situation could be developed, with appropriate weightings for each of the components:

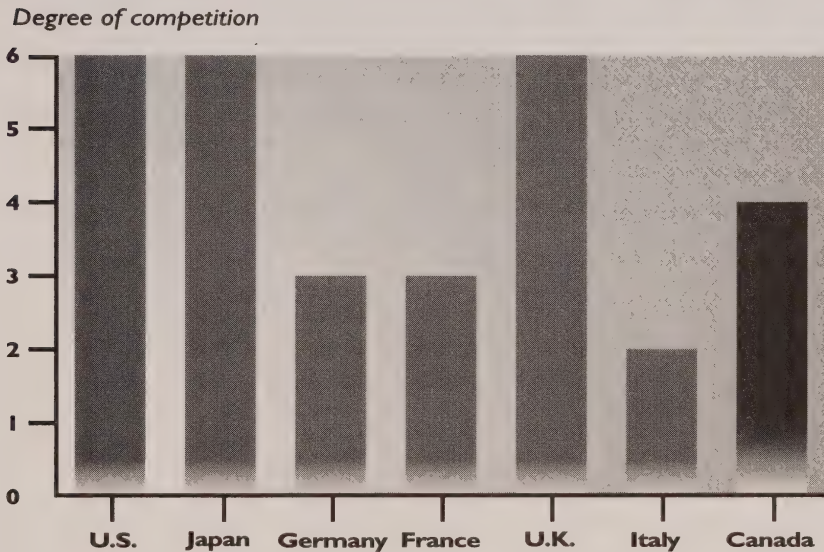
Component	Proposed weight
Spending on ICT as share of GDP	One
Human development index	One
Overall competitiveness index	One
Trade	Percentage
Inflation	One
Research and development	Two

Based on the data provided, Canada would rate moderately high on ICT spending, very high on the human development aspect, medium on competitiveness, very high on trade, very high on inflation, and moderate on R&D.

Government Policies and Regulation

In this section, a subset could be designated as competition/regulation to measure the relative liberalization of primarily telecommunications markets. Elements of trade liberalization and content regulations could also be considered. At this time, consideration is given to competition in the following areas: local competition, long distance competition, international competition, private networks, mobile (cellular) communications and terminal equipment. Each of the countries is rated according to a weighting of one for each of the above areas of competition (Figure B-9).

Figure B-9
Levels of Competition/Deregulation, 1995



In establishing an overall weighting for the competition/regulation subset, a weighting of one would be appropriate.

Canada is in the process of liberalizing local competition in the short term and international competition in the longer term.

There are two sides to analyze the performance of the underlying information economy with respect to government policies and regulations and the general economic situation. These two main areas are the supply of ICTs by the private and public sectors and the demand for ICTs by households, businesses and governments.

Supply

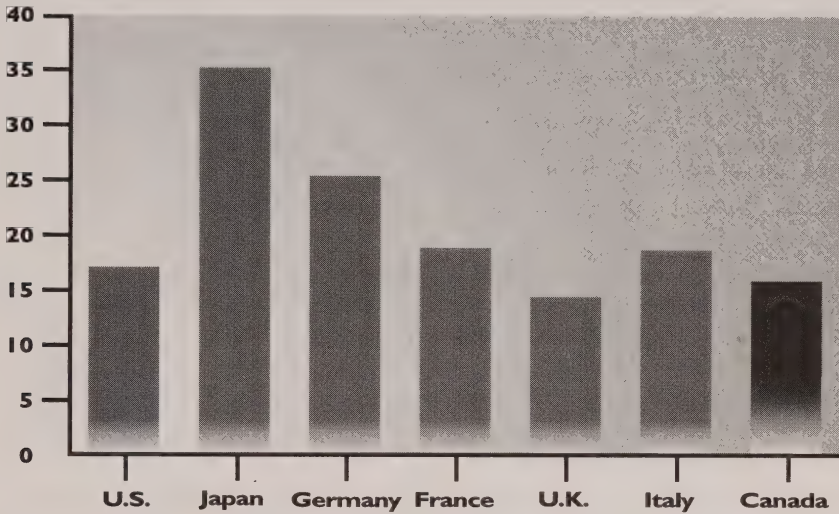
On the supply side, there were three subsets to be considered: investment, modernization and pricing.

Investment

Investment relates to the level of capital spending for network expansion, growth, maintenance and modernization. It does not take into account the rate at which capital investments are recovered through depreciation. Measures of productivity and return on equity could also be included. More international details are required on investments in the ICT areas. Public telecommunications investment figures are available from the OECD on the basis of total investment, as a percentage of revenue, per mainline, per capita and as a percentage of gross fixed capital formation (GFCF). Investment as a percentage of revenue is selected (Figure B-10), as it represents reinvestment into the infrastructure.

Figure B-10
Telecommunications Investment
as a Percentage of Revenue, 1995

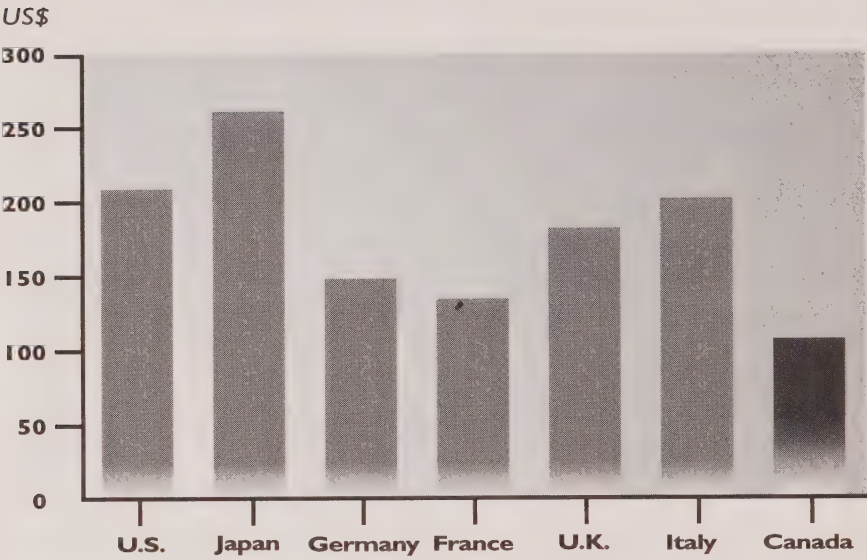
Share of revenue (%)



Source: Data provided by the Organisation for Economic Co-operation and Development.

One measure of productivity is the ratio of revenue per employee in the telecommunications environment (Figure B-11).

Figure B-11
Telecommunications Revenue
per Employee, 1995



Source: Data provided by the Organisation for Economic Co-operation and Development.

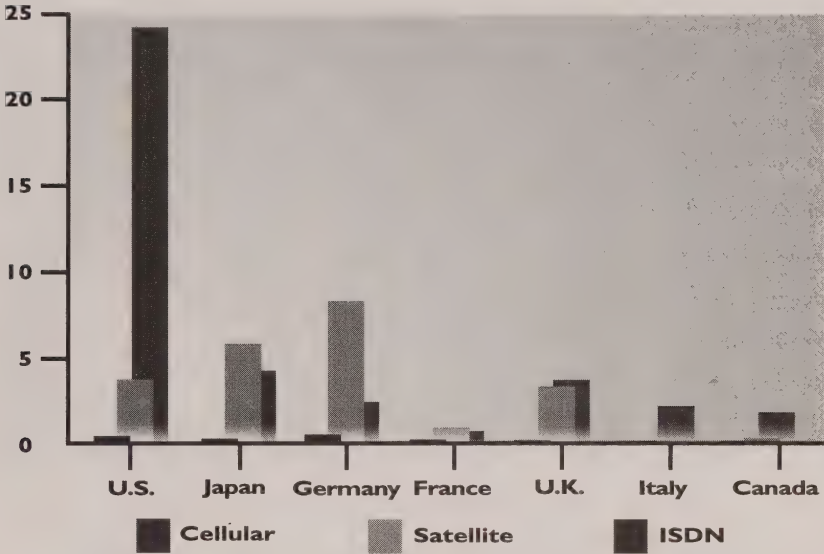
Modernization

Modernization includes areas such as digitization of networks, advanced networks and software, new products and services and their availability to the population (Figure B-12). Because of the competitive nature of many of the new services, some of these data are not reported to the international agencies.

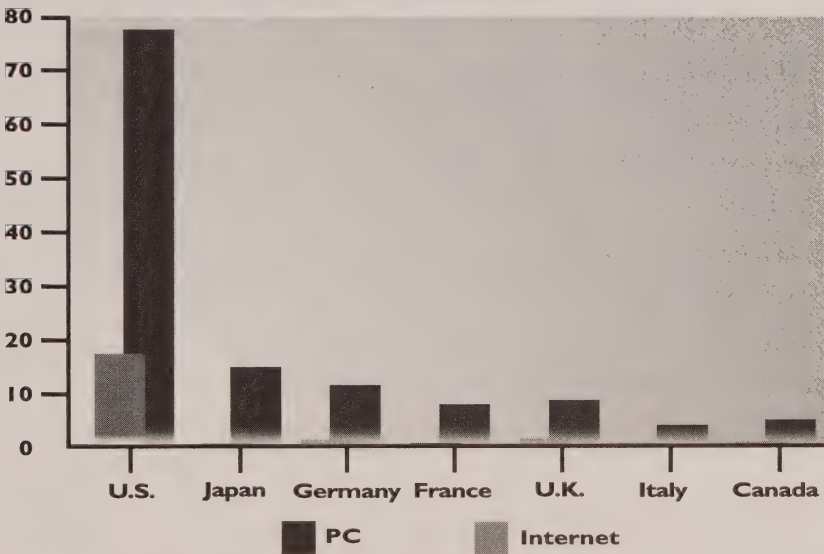
Other modernization aspects include digitization of the networks, fibre optic deployment, expenditures on switching and transmission infrastructure, and telecommunications exchanges. The latter two have scattered reportings, and the figures on fibre optic deployment are not useful when considering geographic aspects. Digitization is selected as the better indicator (Figure B-13).

Figure B-12
Modernization of Products and Services, 1994

Users (millions)



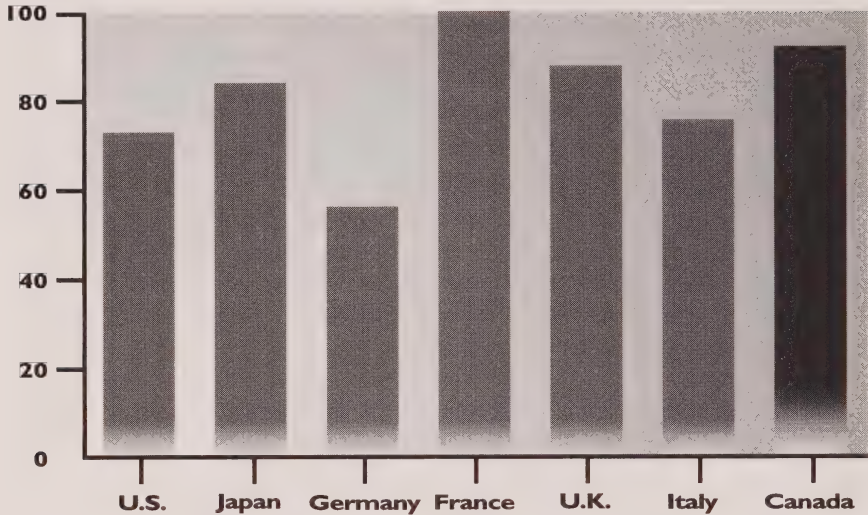
Users (millions)



Source: International Telecommunication Union, *World Telecommunication Development Report* (Geneva: ITU, 1996).

Figure B-13
Digitization, 1995

Digital lines (% of main telephone lines)

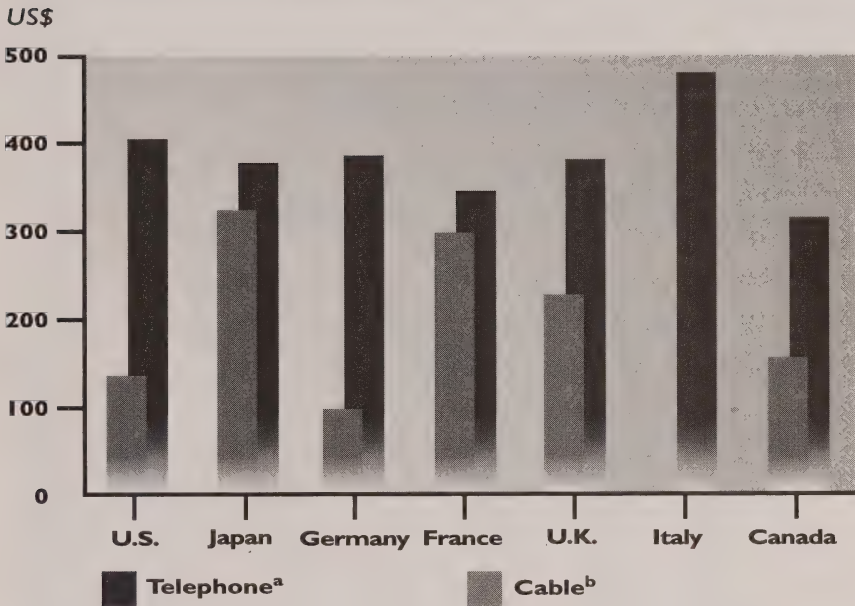


Source: International Telecommunication Union, *World Telecommunication Development Report: Trade in Telecommunications; World Telecommunication Indicators, 1996/1997* (Geneva: ITU, 1996).

Pricing

Traditionally, for the regulated industries, prices were not cost-based, nor were they set by market forces but rather by regulators. Prices vary today because of considerations of value of services, subsidies, contribution and interconnection charges. The OECD has also created a basket of prices, which provides some indication of price comparisons based on tariffs (Figure B-14). Prices can be measured with the consumer price index (CPI) and vary from year to year. However, on an international basis, these are difficult to measure because of wide changes in currencies. More precision on the measure of these prices is required.

Figure B-14
Annual Prices for Services, 1995



^a Basket of residential service charges, January 1996.

^b Cable television prices.

Source: Data provided by the Organisation for Economic Co-operation and Development.

In the area of pricing, international statistical data related to subsidies, interconnection charges, etc., are required.

Based on the above subsets, the supply-side indicator could be developed with the following weightings assigned for each of the components:

Component	Weightings
Investment	1
Modernization	Range 1 to 10
Pricing	Range 1 to 10

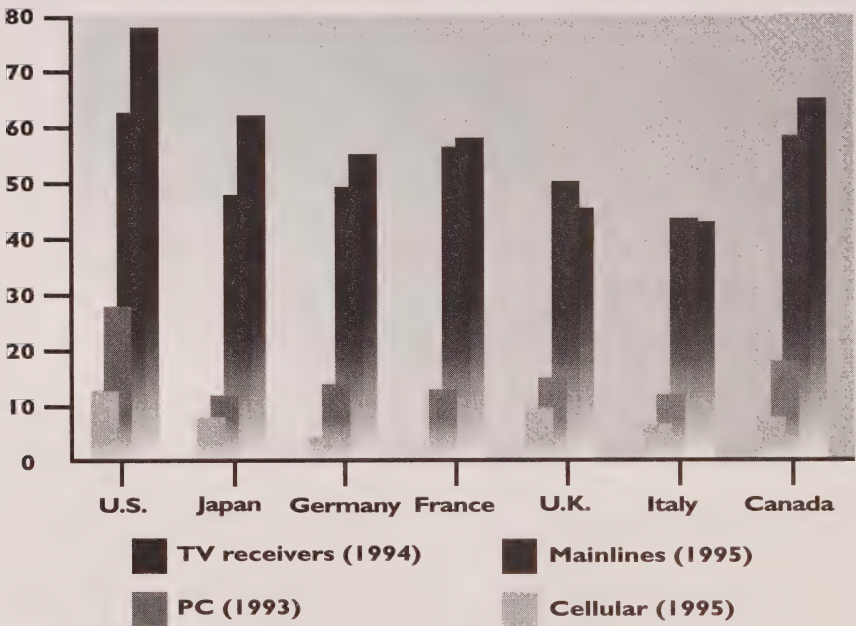
In terms of the data provided, Canada would rate moderate on investment, very high on modernization, and high on pricing aspects.

Demand

The primary concern of this section is penetration and use of ICTs as well as the diffusion of technologies into the household, businesses and governments of the country (Figure B-15).

Figure B-15
Penetration Rates per 100 Inhabitants

Number per 100 inhabitants



Source: Data provided by the Organisation for Economic Co-operation and Development.

These measures provide an indication of the density of communications and information technology services.

Based on the subset of components, a weighting range of 0 to 1 could be developed for the demand indicator.

Canada would rate moderate to high in the demand area.

Employment

In the employment area, there is a need for an overall employment indicator.

Consideration can be given to the following components: education, human resources skills and training, and employment in ICT areas.

Education

For education, the index developed by the UN Development Programme, based on expenditures, provides a good indicator.

Country	Education Index
Canada	0.99
U.S.	0.98
France	0.95
U.K.	0.94
Japan	0.92
Germany	0.92
Italy	0.88

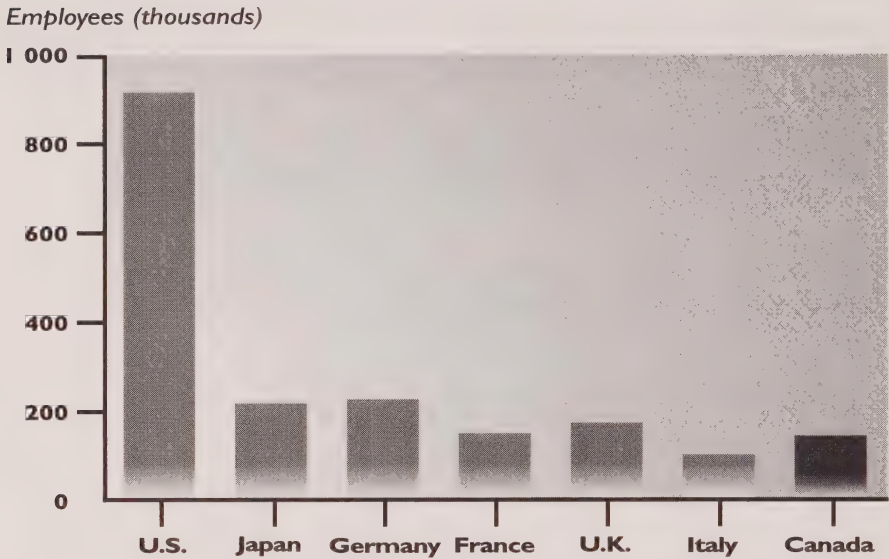
Source: Data provided by the United Nations Development Programme, 1996.

It may be more relevant to view a subset of education related to graduates in computer sciences and engineering as well as those trained in computer programming areas.

Employment

Employment in ICT areas could provide some additional information. However, information in this area is limited (Figure B-16).

Figure B-16
Public Telecommunications Operator
Employees, 1995



Source: Data provided by the Organisation for Economic Co-operation and Development.

Employment is a key outcome of information infrastructure development. What is required is a measure of growth of employment in ICT as a share of total employment.

Factors to consider are:

Component	Weighting
Education	1
ICT share	1

Canada would likely rate very high in these areas.

INTERNATIONAL BENCHMARKING

A set of key indicators with weights for the components could be developed to assess the status and evolution of the information infrastructure. This provides an initial summary of those indicators that could be considered.

As an initial comparison, based on the data available, and considering the proposed set of indicators, Canada could be rated as follows:

Indicator	Components (if any)	Rating
Gross domestic product	Information and communications technology (ICT) spending; Human development	High
Competitiveness	Competitiveness; Trade; Inflation; R&D	High
Competition/regulation	—	High
Investment	Capital spending; Revenues	Medium
Modernization	Products and services; Digitization	Very high
Pricing	—	High
Overall technology penetration	—	High
Employment	Education; ICT employment	Very high

Overall, Canada rates high to very high in the majority of categories. As efforts are proceeding internationally to adopt a set of statistical indicators and to develop more precision in the data provided, Canada could adopt a set of indicators to measure the performance of the information infrastructure, with particular attention to those relating to investment in infrastructure, growth of information and content-based services and diffusion of these technologies within the economy.

PRIME CONSIDERATIONS AND FUTURE WORK

In order to develop key indicators, a prime consideration is the timing and relative comparability of the statistical data provided. For example, a considerable portion of the statistical data available is for the period 1990–95, with only updates available in March 1997 and the end of 1998. As well, the timing of data provided from international agencies, associations and private corporations is not in synchronization with those provided from central statistical agencies, other government departments and regulators.

Future and ongoing work in this area must track the following changes taking place:

- changing skills in the industry
- new and refined price indices
- accounting rate changes
- indicator of bandwidth to the home, business, government and other users
- network evolution (advanced systems, new networks, digitization)
- trend tracking (internet, electronic commerce)
- new services (ADSL, PCS, LMCS, cable modems)

Central statistical agencies have provided some cautionary comments regarding difficulties and discrepancies in the collection of statistics related to GDP, trade, R&D in telecommunications, prices and employment. Statistics related to the information infrastructure are becoming a primary area of collection — these include more specific information on home computers (capacity, memory, use) and Internet use as part of their annual household surveys as well as those related to new technologies (i.e. PCS, etc.).

In addition, beyond the annual household surveys and initial business survey in June 1995 conducted by Statistics Canada, additional surveys are planned for 1997 in electronic commerce (financial institution survey).

Annex C

CANADA'S PROGRESS TOWARD A KNOWLEDGE SOCIETY

At the conclusion of Phase I, the Advisory Council made 224 recommendations calling on governments, the private sector and individual Canadians to take action to advance the Information Highway in Canada. These recommendations addressed a wide range of issues: the need to develop Canada's information infrastructure and use it to generate jobs and economic growth; how to improve access to the Information Highway; the importance of ensuring a prominent place for Canadian content; the need to establish a lifelong learning culture in Canada; and the expanded role of government as a model user of information technology. Action is already completed or under way with respect to some 80 percent of these recommendations.

Table C-1
Status of Phase I Recommendations

Categories of recommendations	Actioned/ agreed	Under way	Government committed	Under study	No action/ alternate approach	Totals
Infrastructure	44	7	—	3	1	55
Access	9	3	6	4	2	24
Content	12	9	5	15	1	42
Economic growth and jobs	4	7	13	—	3	27
Learning, workplace and community issues	10	19	2	5	11	47
Government as a model user	11	8	1	—	4	24
Policy coordination	3	1	—	—	1	5
Totals	93	54	27	27	23	224

Tables C-1 and C-2 represent the Council's assessment of the status of its Phase I recommendations and show that governments and the private sector have made considerable progress in all areas. These advances have been most marked in the areas of infrastructure, economic growth and jobs, and government as a model user. We sound a note of caution, however, in offering this "report card." The process of classification inevitably oversimplifies implementation of what is essentially a complex, long-term plan for economic and social transformation.

In *Building the Information Society: Moving Canada into the 21st Century*, the government committed itself to strategies for Canadian content and for access to the Information Highway; these may well go a long way toward carrying forward many of the Council's recommendations in these areas. Many of the content recommendations now under study dealt with copyright issues related to the Information Highway. While some of the Council's recommendations on copyright were addressed in the Phase II amendments to the *Copyright Act* (April 1997), the government has promised to deal with the outstanding concerns in the next phase of copyright revision.

Lifelong learning is one area where a requirement exists for further action from government. Although the federal government can participate in many learning initiatives, education is the responsibility of provincial and territorial governments. A national effort to build a lifelong learning culture in Canada, as recommended by the Advisory Council, will therefore require a high level of cooperation among governments and a commitment to joint initiatives, based on governments' respective responsibilities for education, training and technology. In the body of this report above, the Council has made several recommendations intended to "kick-start" this process of partnership and consensus building.

Table C-2 provides a summary picture of government actions in relation to the Council's Phase I recommendations, in the areas of:

- building Canada's information infrastructure
- access — cornerstone of the information society
- Canadian content — creating an Information Highway for Canadians
- an Information Highway for jobs and growth
- learning, workplace and community issues
- government as a model user
- policy coordination.

Table C-2
Phase I Recommendations and Government Actions

Phase I recommendations	Status
Building Canada's Information Infrastructure	
<p>Role of private sector: Recs. 1.2–1.5 and 11.1 emphasized the primary role of market forces, competition and the private sector in building the Information Highway.</p>	<p>Agreed: From <i>Building the Information Society</i>: “The Government of Canada believes that Canadian companies must build a low-cost, high-quality Canadian Information Highway that truly responds to Canadian needs in all their diversity. The private sector should undertake the necessary investment in infrastructure, bearing the risks and reaping the associated rewards — to the benefit of all Canadians.”</p>
<p>Role of government and sustainable competition: Recs. 1.1, 1.5, 11.1 and 12.4 underscored the role of the government in creating an environment for sustainable competition.</p>	<p>Agreed: From <i>Building the Information Society</i>: “. . . the Government of Canada is moving rapidly to create a competitive environment in which Canadian firms can be innovative and create wealth and jobs for all Canadians. Competition must, however, be sustainable and must be consistent with those cultural and social goals that are central to the Canadian experience.” These principles have been applied in a series of policy and regulatory decisions over the past three years (see below).</p>
<p>Convergence policy: Recs. 1.1, 1.2, 1.4, 2.1, 2.6, 2.8–2.12, 2.13, 2.15–2.19, 3.1, 11.1, 11.2 and 12.6 addressed various aspects of the convergence issue, particularly the need for urgent action to set the rules for sustainable competition between cable and telephone companies.</p>	<p>Actions taken: In August 1996 the government released its convergence policy, which clears the way for fair and sustainable competition between cable-TV and telephone companies. The policy provides a level playing field for competition while ensuring that the cultural objectives of the <i>Broadcasting Act</i> are fully respected. Competition in the delivery of television signals and the provision of local telephone services will stimulate investment in the new technologies and services critical to building Canada's Information Highway.</p>

Table C-2 (cont'd) Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Convergence regulation: Many of the recommendations referred to above called for CRTC action on the regulatory front.</p>	<p>Bill C-57 amended the <i>Bell Canada Act</i> to remove the prohibition on Bell Canada holding a broadcasting licence. In 1996, the Minister of Canadian Heritage released new broadcasting rules for domestic ownership more in line with those for the telecommunications industry.</p> <p>Under study: In the Council's view, there was also the need to clarify the definition of broadcasting. In the August 1996 convergence policy, the ministers of Industry and Canadian Heritage agreed on the need for such clarification and committed themselves to further work on this issue.</p> <p>Actions taken: In the two years since CRTC issued its convergence report, the Commission has taken a wide range of actions. The most important have been follow-up to Telecom Decision 94-19, which established a broad regulatory framework for telecommunications and addressed convergence, competition, price caps, the scope of inter-exchange contributions, deregulation and forbearance from regulation, rate rebalancing, convergence and safeguards for fair competition.</p> <p>In March 1997, the CRTC released a policy framework for competition in broadcast distribution. On May 1, 1997, the CRTC released key decisions setting rules for local telephone competition, implementing price cap regulation for non-competitive markets, broadening the scope of services paying inter-exchange contributions and determining responsibility for recovery of costs for local number portability (to ensure a customer can keep the same telephone number when switching to another carrier).</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Action under way: On the same day, the Commission announced that in 1998 "all the milestones will be in place leading to true competition and convergence in the telecommunications and broadcasting distribution industries." Effective May 1, 1997, cable companies have been able to enter the local telephone market. Effective June 16, 1997, telephone companies will be able to apply for broadcasting licences to enter the broadcast distribution market after January 1, 1998. Applications for trials of video programming delivery have already been granted to Bell Canada and Telus.</p> <p>Major decisions still to come include: forbearance from regulation of toll services provided by dominant carriers; co-location; resale and sharing of cellular services and the licensing of video-on-demand services.</p>
<p>Elimination of geographic gaps in federal regulatory coverage is covered in Rec. 2.2.</p>	<p>Under study: Pursuant to Section 133 of the <i>Telecommunications Act</i>, SaskTel is exempt from federal jurisdiction until October 25, 1998. The exemption will only expire with the issuance of an Order in Council after that date.</p>
<p>Equal access to multi-tenant buildings and rights of way: Rec. 2.3 called for fair and equal access by all providers of communications services.</p>	<p>Action under way: The government's Convergence Policy Statement of August 6, 1996, addressed this issue in the following terms: "In dealing with the wiring inside a consumer's premises, the objective should be to ensure that consumer choice is not limited but rather gives the consumer the ability to obtain services from any combination of suppliers they choose, without unnecessary inconvenience.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Regulation should aim to achieve this objective." The CRTC has addressed this issue in recent proceedings and decisions, and has authority to deal with specific concerns on a case-by-case basis as they arise.</p>
<p>Overseas telecom policy: Recs. 1.7 and 2.5 called for more competition in international telecommunications services.</p>	<p>Action taken: In February 1997, negotiations under the General Agreement on Trade in Services (GATS) aimed at securing a multilateral framework for trade in basic telecommunications services were concluded. The agreement commits Canada to a liberalization of its international telecommunications and satellite services.</p>
<p>Promoting wireless and new services: Recs. 2.4, 11.1, 11.2, 11.3 and 12.4 emphasized the importance of a pro-competitive policy and regulatory framework and government collaboration with the private sector to encourage aggressive investment in research and development (R&D), with special emphasis on wireless technologies.</p>	<p>Action taken: The government continues to strive for consistent spectrum assignments in accord with international radio regulations while protecting Canadian spectrum from foreign interference direction and control.</p> <p>In licensing Local Multipoint Communications Systems in October 1996, the Minister of Industry for the first time auctioned a portion of the radio frequency spectrum.</p> <p>Actions under way: Through the Advanced Satcom Initiative, Industry Canada has supported and shared the risks of the private sector as it undertakes the early development and commercialization of new satellite-based multimedia services. The initiative will culminate in the early 2000s with implementation of a commercial system.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>In October 1995, the Minister of Canadian Heritage established an industry-government task force to give advice on a policy framework to manage and coordinate the transition to digital television in Canada. The first report is expected in summer 1997 with the first receivers/introduction of services by the latter part of 1998 or early 1999.</p> <p>A spectrum allocation plan for digital radio was issued in 1996, followed by proposals in 1997 for a spectrum policy to permit use of digital radio for non-broadcasting purposes. In 1996, the CRTC issued transitional licences for digital radio services. The Commission will begin a public process to develop a long-term policy approach to digital radio, laying the foundation for the transformation of today's AM and FM radio stations into digital radio broadcasters.</p>
<p>Personal communications services (PCS): Recs. 2.20–2.27 enunciated principles to govern the licensing of PCS (consistent with Recs. 11.1–11.3 and 12.4).</p>	<p>Action taken: In December 1995, the Minister of Industry licensed four companies to provide PCS on a competitive basis across Canada.</p>
<p>Digital scanners: Recs. 10.5 and 10.6 called on government to extend to users of wireless services the same level of privacy protection as users of landline connections have.</p>	<p>Action taken: The Minister of Industry has limited the use of digital scanners to law enforcement agencies, spectrum management and service providers for radio system monitoring through licensing. Technical standards have also been disseminated.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>New tax credits for Information Highway R&D: Rec. 11.4 calls for the expanded federal R&D tax credits for Information Highway R&D.</p>	<p>Action not taken: The federal government already plays a major role in promoting R&D through broadly-based tax incentives to businesses that perform R&D. These total over \$1.2 billion per year, a large portion of which is in respect to information technology R&D. More targeted assistance is provided through a number of grant-based programs.</p>
<p>Research and development: Recs. 11.6–11.8, 11.10, 11.12, and 11.13 address the role of government laboratories and measures to stimulate R&D by industry and other institutions.</p>	<p>Actions taken: Three of the government's core research activities set out in the Science and Technology Strategy will strengthen the private sector's R&D effort on the Information Highway. These involve: supporting research in universities and colleges, the Canada Foundation for Innovation, Networks of Centres of Excellence and other non-government research institutions; supporting private sector research and technology development and providing information and analysis; and building networks. The strategy outlines a new governance system with mechanisms for receiving expert external advice and achieving better inter-departmental coordination and management.</p> <p>The National Research Council (NRC) plays a key role in coordinating the activities of government agencies in relation to Information Highway technical issues. NRC's Canadian Institute for Scientific and Technical Information (CISTI) has announced the formation of eight NRC information centres (with two more to follow), which will provide relevant, timely S&T information services to encourage innovation in local communities across Canada. Linked electronically to CISTI's world-class collection of scientific, technical and medical literature, its supporting networks and information specialist expertise and</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Canada's largest research press, the National Information Centres are key gateways for S&T information. NRC's Institute for Information Technology and CISTI have initiated an R&D program aimed at developing technologies that will facilitate interactive access to digital information.</p>
<p>Communications Research Centre: Recs. 11.3 and 11.6–11.12 are all applicable to the CRC.</p>	<p>Action taken: Industry Canada's Communications Research Centre (CRC) mainly focusses on R&D in advanced wireless communications. The lab works closely with industry, giving firms access to its facilities and work. In the past year, the CRC held meetings with CEOs from research consortia to develop closer collaboration with the private sector. The CRC provides facilities for industry to test new broadband applications and technology and users' responses to new broadcasting technologies. The centre carries out many joint research projects with small and medium-sized businesses across Canada and helps put together private consortia for other projects. The CRC invites private sector scientists to work with its own staff to commercialize technologies developed at the centre. The CRC also acts as a hub of expertise for many Canadian information technology companies.</p>
<p>Inventory of Information Highway initiatives: Rec. 11.14 calls for a central, electronically available inventory.</p>	<p>Action taken: Canadian Initiatives on Networking Clearing House (CINCH), housed on Industry Canada's <i>Strategis</i> website, provides information on the development of infrastructure, applications, programs and initiatives related to the Information Highway. CINCH contributes to the G-7 Global Inventory Project providing an on-line electronic inventory at the international level.</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Electronic directory of science and technology (S&T) assets: Rec. 11.9.</p>	<p>Action under way: Though no comprehensive directory of Canadian S&T assets exists, action is under way through the Canadian Technology Network (CTN). The National Research Council, working with Industry Canada, is providing a service to match small and medium-sized businesses with sources of technological expertise and related business advice. To date, CTN has recruited more than 500 organizations as members and has its own home page on the World Wide Web.</p>
<p>Phase II of CANARIE: Rec. 11.5 endorsed Phase II of CANARIE. Activities undertaken in Phase II are also relevant to Recs. 11.15, 11.16, 11.19, 11.20, 11.24 and 13.10.</p>	<p>Action taken: Phase II of CANARIE, which began March 1995, will require \$78.5 million in federal funding over four years. Last November, 50 projects involving 175 Canadian firms, universities and research organizations received \$18.5 million to develop technology, business, health and educational applications for the Information Highway. This investment could lever more than \$70 million from the private sector. The government has also been considering commercialization of CANARIE after Phase II.</p>
<p>Standards: Recs. 2.14, 4.1-4.4, 12.5 and 13.6 call for government-industry collaboration in the development of open, interoperable standards.</p>	<p>Action taken: Industry Canada and the Telecommunications Standards Advisory Council of Canada (TSACC), a government/industry partnership, have undertaken a comprehensive study to develop a "standards road map" for Canada's Information Highway. The road map identifies key points of interconnection where standards may be applied to achieve the desired degree of interoperability. The study makes concrete recommendations and proposes potential interconnection scenarios that may be used to build Canada's Information Highway.</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Action under way: These measures will complement steps taken by the government as a model user to implement open standards in the procurement of the major components of its communications infrastructure. Government procurement in building the Government Enterprise Network (GENet) taking due account of standards strategies developed in close cooperation with industry through the Telecommunications Standards Advisory Council of Canada (TSACC) will reinforce this activity.</p>
Access — Cornerstone of the Information Society	
<p>National access strategy: Recs. 1.5, 7.3, 11.2, 11.3, 11.18, 11.23, 13.1–13.7, 13.10–13.15, 13.19, 13.21 and 13.22 address principles and elements of a national access strategy.</p>	<p>Government commitment: By the end of 1997, the ministers of Industry and Canadian Heritage will develop a national access strategy involving policy, regulatory and other measures to ensure affordable access by all Canadians to essential communications services. The ministers of Human Resources Development and Health will join the Minister of Industry to bring forward a framework for action that supports the use of information technology, information services and networking applications in the areas of learning and health.</p> <p>Actions taken: Access was a key topic discussed at the September 1996 meeting of federal, provincial and territorial ministers responsible for the Information Highway. Officials were tasked to develop specific proposals for ministers' consideration at their next meeting later in 1997.</p>

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Phase I Recommendations and
Government Actions

Phase I recommendations	Status
	<p>The federal government has established an inter-departmental working group on access, involving officials from Industry Canada, Canadian Heritage, Human Resources Development Canada (HRDC), Health Canada, Agriculture and Agri-food Canada, Status of Women Canada, the National Library and Finance. HRDC is undertaking a study of social aspects and barriers to access to the Information Highway — the influence of social factors (age, disability, ethnicity, education and income levels, etc.)</p>
<p>Community access: Recs. 9.4, 9.5, 9.10, 9.11, 11.3, 12.2, 13.10–13.12 and 13.14 call for a range of initiatives to improve access within communities to the Internet and government information and services.</p>	<p>Actions taken: Industry Canada's Community Access Program enables people in rural and remote communities to access the Internet. The program electronically delivers government services and information to these communities and helps them develop skills for the information economy. The 1997 Federal Budget added an additional \$30 million to the Community Access Program to expand the target number from 1 500 communities to 5 000 communities by fiscal year 2000–01. Under the Federal Youth Employment Strategy, CAP sites will develop employment opportunities for up to 1 000 Canadians aged 15–30 years.</p> <p>Under the SchoolNet Program, LibraryNet facilitates the connectivity of Canadian libraries to the Information Highway and supports innovative uses of the Internet by libraries. Approximately 25% of Canada's 3 400 public libraries are connected to the Internet.</p> <p>In conjunction with the Community Access Program, Connect New Brunswick will bring Internet access to 200 community access centres across the province over the next three years.</p>

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Phase I recommendations	Status
<p>People with disabilities: Recs. 9.7, 13.15–13.18 and 15.5 address access issues of concern to people with disabilities.</p>	<p>Actions taken: Canadians with disabilities require access to the Information Highway. To assist in determining and meeting these needs, Industry Canada has set up the Assistive Devices Industry Office and established a Minister's Advisory Committee on Assistive Devices. HRDC's Office for Disability Issues works in partnership with national disability organizations to maintain an Internet information directory of global disability resources called INDIE. In fall 1996, Treasury Board published Internet guidelines addressing access by people with disabilities.</p>
<p>Special billing and use of procurement power to support people with disabilities: Recs. 13.16 and 13.17 address these concerns.</p>	<p>No action to date: The government has yet to establish policies to require a different basis for billing people with disabilities for communications services or on the government using its procurement power to encourage private sector-driven services to be made available for people with disabilities.</p>
<p>Gender concerns: Recs. 13.21 and 13.22 address gender concerns, related to the Information Highway.</p>	<p>Action under way: The <i>Federal Plan for Gender Equality</i> recognizes that policies and programs affect women and men differently, given that each experience different social and economic life circumstances. The government's May 1996 action plan for the Information Highway calls on all relevant federal departments to undertake a gender-based analysis of Information Highway initiatives, where appropriate.</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Preferential tariffs for education and health entities: Recs. 11.18, 11.23, 13.9 and 13.19 call for preferential telecommunications tariffs for educational and health organizations.</p>	<p>Under study: In September 1996, the CRTC allowed preferential tariffs on telecommunications services for non-profit educational and health service entities. The new preferential tariffs apply to competitively provided services only and must cover the costs of providing the service — restrictions that may detract from the value of the preferential tariffs to customers. To our knowledge, no such tariffs have yet been offered. The decision does not respond fully to the Council's recommendations.</p>
<p>Individual Line, touchtone service: Rec. 13.7 saw this as a minimum level of access to the public network by 2000.</p>	<p>Action taken: Regulated telephone companies have promised that most, if not all, of their business and residential customers in rural and remote areas will have digital, single-line phone service by the year 2000.</p>
Canadian Content — Creating an Information Highway for Canadians	
<p>Reinforcement of Canadian cultural policy: Rec. 7.1.</p>	<p>Agreed: From <i>Building the Information Society</i>: "The Government of Canada believes that Canadian cultural policies must be reinforced in relation to the Information Highway." This principle was also affirmed in the government's convergence policy statement released in August 1996.</p>
<p>Confirming role of CRTC: Rec. 7.2.</p>	<p>Agreed: From <i>Building the Information Society</i>: "The CRTC will continue to play its important role to ensure the fulfilment of the long-standing cultural policy objectives enshrined in the <i>Broadcasting Act</i>." This principle was also affirmed in the government's convergence policy statement.</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
Carriage-content separation: Rec. 7.7 calls for retention of the principle of carriage-content separation.	Agreed: From <i>Building the Information Society</i> : “... within the emerging information industry itself, there are signs of growing vertical integration between providers of broadcasting carriage and content services. This trend could ultimately leave providers of Canadian content vulnerable to discrimination. The present policy and regulatory framework may have to take into account this new reality.”
Canadian content strategy: Recs. 2.7, 7.1–7.3, 7.5–7.7, 7.10, 7.13–7.18, 12.3 and 13.14 articulate principles and measures for implementing a comprehensive strategy for Canadian cultural content.	Government commitment: As outlined in <i>Building the Information Society</i> , the Minister of Canadian Heritage will develop, in consultation with other departments and the provinces, a comprehensive strategy for Canadian cultural content in the information society. This strategy will involve: <ul style="list-style-type: none">• expanding opportunities for economic growth and job creation• employing regulatory, financial and structural measures to support the production, distribution and promotion at home and abroad of Canadian cultural content reflecting our linguistic duality and cultural diversity• fostering an ongoing national cultural dialogue within Canada• promoting dissemination of the government's public information holdings. Actions taken: Foundations for this strategy are already in place. These include: <ul style="list-style-type: none">• the Canada Television and Cable Production Fund (CTCPF), combining \$100 million in new government funding with the resources of Telefilm Canada's Broadcast Development Fund and the Cable Production Fund

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Phase I recommendations	Status
	<ul style="list-style-type: none"> • a \$5 million a year increase to the federal Sound Recording Development Program • \$5 million more in 1996-97 and \$2.3 million more in 1997-98 for the Book Publishing Industry Development Program and a commitment to realistic long-term measures to encourage more stable financing for Canadian publishers.
<p>Access to capital by Canadian cultural content multimedia producers:</p> <p>Recs. 7.14, 7.15 and 7.20 focus on access to capital and funding. Recs. 7.15 and 7.16 refer to tax incentives or credits.</p>	<p>Actions taken: The Cultural Industries Development Fund (CIDF), funded by Canadian Heritage and administered by the Business Development Bank of Canada has provided more that \$3.9 million in loans to multimedia producers. Telefilm Canada has initiated a pilot program of \$1 million for multimedia production and marketing.</p> <p>Under study: Canadian Heritage is examining funding programs for multimedia producers in major developed countries. Also, Canadian Heritage is examining the feasibility of a tax credit for multimedia producers. Harmonization of federal and provincial/territorial support activities is also being examined.</p>

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Phase I recommendations	Status
<p>Export development strategy: Recs. 7.10, 7.15, 7.17 and 12.3 address the importance of developing export markets for Canadian content.</p>	<p>Action taken: The ministers of Industry and Canadian Heritage, with the ministers of Foreign Affairs and International Trade and Human Resources Development, in partnership with the private sector and the provinces, have developed a series of international business strategies spanning 23 industry sectors, including the arts and cultural industries.</p> <p>Action under way: Regional Trade Networks linking federal and provincial governments and agencies are being designed to pool expertise and resources to provide more efficient services and information to business.</p>
<p>Learning opportunities for creators: Rec. 7.12 calls for opportunities for creators to learn to use new technologies.</p>	<p>Action under way: The Minister of Canadian Heritage, with the Minister of Human Resources Development, are encouraging collaboration among creators, the information industries and research centres to develop new tools and products and expand the pool of content creation skills. The focus is on developing pilot projects and identifying specific opportunities for training and R&D. Canadian Heritage has identified collaborative R&D drawing on creators and researchers as a key priority to catalyze content development. Strategic plans for the design of a new national collaborative research initiative will be completed by summer 1997.</p>

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Phase I Recommendations and
Government Actions

Phase I recommendations	Status
<p>Digitization: Recs. 7.8, 7.9, 7.21 and 11.29–11.35 called for measures to encourage the digitization of Canadian content.</p>	<p>Action under way: In March 1997, the ministers of Canadian Heritage and Industry established the Task Force on Digitization to address the following key issues: selection of materials for digitization, funding for digital conversion, revenue generation opportunities, navigational tools, standards, connectivity, copyright, preservation and partnerships. The final report with a Strategic Framework for Digitization is expected in November 1997.</p> <p>In addition, through Industry Canada's Science Promotion and Academic Affairs Branch, work is under way to support electronic access to information in Canada's research libraries and universities and the electronic publication of scholarly materials.</p> <p>Actions taken: Digitization initiatives already under way across the federal government include:</p> <ul style="list-style-type: none"> • The Canadian Heritage Information Network (CHIN), a special operating agency of Canadian Heritage, provides on-line access via the Internet to comprehensive reference services and the 25 million objects in national inventories of Canadian museum collections. • The National Library of Canada, through its Access AMICUS service, allows Canadian libraries and researchers to search electronically through 10 million bibliographic authority records for purposes of reference, information verification, cataloguing support and interlibrary loans. • The National Archives of Canada, through its website, provides access to information about its archival holdings and services, including directions for conducting archival research, virtual exhibitions, publications, genealogical databases and guides.

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Phase I recommendations	Status
	<ul style="list-style-type: none"> • In 1993, the Canadian Museum of Civilization formed a strategic alliance with Kodak Canada to operate an Imaging Centre at the museum. Hundreds of thousands of images have now been digitized. The museum offers its imaging services in Canada and around the world. • The National Film Board has worked with CHIN and the national museums to develop new Canadian content in other digital media, such as CD-ROMs. Some 7 000 films will soon be digitized. • The SchoolNet Digital Collections program announced in the March 1996 Budget has the potential to match Canadian content development for the Information Highway with opportunities for young people to develop multimedia and business skills. The three-year program will promote access to a wealth of collections in archives, museums, libraries, government departments and agencies and other institutions across the country while exposing Canadian youth to a unique opportunity to learn and develop job experience. <p>Under study are digitization pilot projects and their funding methods.</p> <p>No action to date on revisions to <i>National Library of Canada Act</i> and <i>National Archives of Canada Act</i> to require deposits in digital format, as called for in Rec. 11.32.</p>
<p>Awareness of copyright issues: Recs. 6.11 and 6.13–6.15 focus on measures to raise awareness of copyright issues.</p>	<p>Action taken: Industry Canada operates a program to raise awareness of copyright. In the coming year, the department will be taking further steps to increase understanding of intellectual property concerns in the context of the Information Highway.</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Resolution of outstanding issues and revision of the Copyright Act: Recs. 6.1–6.12, 6.15 and 6.16 address outstanding issues and revisions to the Act for the Information Highway environment.</p>	<p>Action taken: Phase II revisions to the <i>Copyright Act</i>, which received Royal Assent in April 1997, set the stage for phase III revisions that will focus on Information Highway issues. In addition, Canada participated in the negotiation of two new treaties (Copyright and Performances and Phonograms Treaties) under the auspices of the World Intellectual Property Organization (WIPO), which dealt with new technology issues.</p> <p>Government commitment: The government has committed itself to resolving outstanding issues and undertaking Phase III copyright revision in light of the emerging Information Highway environment.</p> <p>Under study: The bulk of the issues under study were raised in Recs. 6.2, 6.4–6.11, 6.14 and 6.15.</p>
An Information Highway for Jobs and Growth	
<p>Creating a solid foundation for electronic commerce: Recs. 2.25, 4.1–4.4, 5.1, 5.3, 9.6, 9.8, 9.10–9.13, 10.1–10.3, 10.7–10.19, 12.2, 12.5, 15.1, 15.2 and 15.5 call for a wide range of measures to lay the basis for electronic commerce within government and throughout the economy. <i>See also government as a model user below.</i></p>	<p>Government commitments: The Treasury Board Secretariat (TBS) has announced that, in collaboration with ministers and the private sector, it will continue to accelerate conversion to electronic commerce as the preferred means for the government to conduct its business, no later than 1998. Many of the lessons learned will be transferable to the private sector. The Minister of Industry, in cooperation with other ministers and levels of government will work with business and other stakeholders to accelerate development and implementation of the policies and legal and technical standards needed to support widespread electronic commerce by the private sector. This strategy will involve working closely with industry</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>to develop and harmonize systems for security and for authenticating the identity of parties to an electronic transaction. The government will also consult closely with organizations and other governments at home and abroad on the legislative reforms needed to provide a sound and consistent legal basis for electronic transactions.</p>
<p>Security of personal data: Recs. 9.5, 9.6, 10.8–10.19, 15.1 and 15.2 address the security of personal data in the context of electronic commerce. <i>See also government as a model user below.</i></p>	<p>Government commitment: The Government of Canada, as part of its initiatives to introduce electronic commerce in government, intends to establish a public key infrastructure (PKI) for government. PKI will be operational by the end of 1998. The Minister of Industry, in conjunction with other ministers and levels of government, will work in partnership with industry and other stakeholders to secure the adoption of similar infrastructures across Canada. For electronic transactions to be seamless, it will be critical to ensure that all such infrastructures are interoperable.</p>
<p>Legislative and other action to protect personal information: Recs. 10.1–10.4.</p>	<p>Government commitment: As a means of encouraging business and consumer confidence in the Information Highway, the ministers of Industry and Justice, in consultation with the provinces and other stakeholders, will bring forward proposals for a legislative framework governing the protection of personal data in the private sector.</p> <p>Action under way: At the September 1996 federal/provincial/territorial meeting of ministers responsible for the Information Highway, an intergovernmental work group was established to seek consensus on minimum national privacy standards and strategies for implementation.</p>

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Phase I recommendations	Status
<p>Integrated health information network: Recs. 10.20–10.23 and 11.15–11.18 called for measures to speed the deployment and application of networking technologies in the health sector.</p>	<p>Proposals will be presented to ministers at their next meeting expected later in 1997. Industry Canada and the Department of Justice will also release a public consultation paper on legislative options in 1997. Draft federal legislation could be ready by 1998. By the year 2000, the federal government aims to have federal legislation on the books.</p> <p>Government commitment: The Minister of Health, in cooperation with provincial and territorial governments, other federal departments, the private sector and professional bodies in the health field, will work on the development of a national strategy to put in place an integrated health information network as part of Canada's Information Highway.</p> <p>Actions taken: In <i>Towards a Canadian Health Iway: Vision, Opportunities and Future Steps</i> released in September 1996, CANARIE further explored this area and called for specific measures to develop this strategy under the leadership of Health Canada. CANARIE's application-oriented research remains a key instrument in catalyzing Canadian efforts to exploit the benefits of the new technology in health, telemedicine, learning and helping people with disabilities.</p> <p>At the January 1997 federal/provincial/territorial conference of deputy health ministers, there was agreement for the need for a National Strategy for a Canadian Health Information Highway and the creation of an Advisory Council, chaired by the Minister of Health. The February 1997 federal Budget provided funding of \$50 million over three years to begin developing, in collaboration with the provinces, a national strategy for an integrated Canadian Health Information System.</p>

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Phase I recommendations	Status
<p>Support for R&D in learnware and health networking: Recs. 7.3, 7.9, 7.15, 7.22, 9.16, 11.15, 11.17, 11.19, 11.21, 11.24, 11.25 and 14.4.</p>	<p>Action taken: The government announced in March 1996 that Industry Canada's Technology Partnerships Canada program will make available annually by 1998-99 some \$250 million in investment support to encourage technological innovation at the near-market end of the R&D cycle. The enabling technologies part of the program will target small and medium-sized businesses in leading-edge, high-growth companies, including those engaged in selected information technologies. Advanced software technologies, multimedia learnware and information technology in the health sector receive particular attention.</p>
<p>Development of electronic learning materials: Recs. 7.21, 7.22, 11.21, 11.33 and 14.3 suggest measures to encourage the development of more electronic learning materials as a means of strengthening the Canadian industry.</p>	<p>Action taken: The federal government, in consultation with provincial and territorial governments, has found ways to build through SchoolNet a rich base of electronic learning materials for the school market, with a major emphasis on French-language and Aboriginal content. From this secure domestic base, Canadian producers of learning materials and courseware will be in a better position to seek export markets. Initiatives include on-line publication of scholarly materials; studies on the economics of scholarly publishing; Canada's SchoolNet grassroots on-line projects; establishment of the Canadian Electronic Scholarly Network on the Internet; and provision of software evaluation services to assist the Canadian courseware industry.</p>

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Phase I recommendations	Status
<p>Financing for small and medium-sized businesses in multimedia: Recs. 7.3, 7.9, 7.15, 7.20, 7.22, 9.16 and 11.21 called for improved access to capital by Canada's small multimedia producers.</p>	<p>Action taken: In the 1996 Budget speech, the government announced the infusion of an additional \$50 million into the Business Development Bank of Canada so that it could increase its financing for strategic growth sectors, such as new technology. Companies in these sectors, including small multimedia producers, will be the engines of growth for the Canadian economy in the transition to a knowledge society. The \$50 million could support up to \$350 million in new financing for small and medium-sized businesses. Western Economic Diversification Canada has created innovative investment funds in partnership with financial institutions to enhance access to capital in emerging advanced technology sectors.</p>
<p>Consumer awareness: Recs. 14.12–14.15 focussed on public awareness strategies and consumer information and protection programs.</p>	<p>Actions taken: The provincial and federal governments are currently negotiating to have similar categories of consumer information available electronically in all jurisdictions. This common strategy is being negotiated by the Consumer Measures Committee as part of the overall approach to elimination of internal trade barriers.</p> <p>Alternate approaches: The federal Office of Consumer Affairs produces and maintains <i>Consumer Connection</i>, an information product part of the <i>Strategis</i> website that is available via the Internet to all Canadians.</p> <p>Maintenance of <i>Consumer Connection</i> involves ongoing partnerships with provinces, consumer groups, and industry. <i>Consumer Connection</i> has been widely publicized through the mass media. The Consumer Help Desk on <i>Consumer Connection</i> is an extensive data base of consumer information</p>

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	which is available online to all Internet users including provincial governments, libraries, consumer groups, and individual consumers and businesses.
Measuring the new economy: Recs. 12.6 and 13.23 call for research on the new economy and the impacts of technology.	Action under way: Industry Canada and Statistics Canada are in the process of developing core statistical indicators for the information economy, and are playing a central role in the work of international organizations on these issues (particularly the OECD).
People and the Information Society: Learning, Workplace and Community Issues	
Employment and labour issues: Recs. 13.23–13.28 and the Minority Report.	<p>Government commitment in <i>Building the Information Society</i>: “The ministers (of Human Resources Development and Labour) will review the relevant recommendations of the Final Report of the Information Highway Advisory Council and the minority report written by the labour representative on the Advisory Council. In order to ensure that these issues receive wide public discussion, they will convene a national forum with involvement by the Canadian labour movement.”</p> <p>Action taken: The <i>National Forum on the Information Highway and Workplace Issues</i> has already taken place. In addition, HRDC, in partnership with the provinces, municipal governments, community agencies and the private sector, has established CanWorkNet, a national electronic directory of Internet sites related to work, career development, labour market information, training, literacy, community development, social services and other related topics.</p>

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	<p>Under study are workplace surveillance issues and a social policy framework supporting labour mobility in all its forms.</p>
<p>Adjustment strategies: Rec.13.23 called for creation of an advisory body to hold fora and lay the basis for policies "to facilitate adjustment to the new environment."</p>	<p>Action taken: In a response to a commitment made in <i>Building the Information Society: Moving Canada into the 21st Century</i>, an Advisory Committee on the Changing Workplace was appointed by the Minister of Labour on August 30, 1996, to study four key issues affecting the changing nature of work. These include: the changing nature of work and the employment relationship; workplace innovation; vision for the workplace of the future and impacts of the Information Highway on workers. The final report is expected in June 1997.</p> <p>Under the leadership of the Minister of Labour and with the sponsorship of the Advisory Committee on the Changing Workplace, the government also organized a <i>National Forum on the Information Highway and Workplace Issues</i> to ensure that workplace issues receive wide public discussion. As the principal background document, IHAC prepared a discussion paper incorporating the views of both labour and business. The National Forum took place simultaneously at six locations across Canada.</p>
<p>Labour standards: Recs. 13.24 and 13.27 called for federal, provincial and territorial discussion and action on labour standards to ensure workers receive adequate protection in the new environment.</p>	<p>Government commitment from <i>Building the Information Society</i>: "The ministers of Human Resources Development and Labour, in cooperation with provincial/territorial governments, will analyze the impact of information technology on employment, workers and the workplace, with a view to ensuring the <i>Canada Labour Code</i> continues to provide Canadian workers, both men and</p>

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	<p>women, with appropriate protection." Amendments to Part III of the <i>Canada Labour Code</i> were tabled in Parliament, but not enacted prior to the dissolution of Parliament in May 1997.</p>
<p>Matching labour supply skill sets and labour demand: Rec. 13.25 called for use of the Information Highway to match job seekers' skills with employers' requirements. Recs. 9.4, 9.10, 9.11, 15.1 and 15.2 address government's role as a model user.</p>	<p>Action taken: HRDC has developed the Electronic Labour Exchange, using new technology to match job seekers' skills with employers' requirements in the Ottawa-Hull area. Registered job seekers can use the Internet to dial up directly or to go to any of the 5 000 public terminal kiosks to match their skills automatically to employers' requirements, and develop job opportunities.</p>
<p>Vision statement for lifelong learning: Rec. 14.1.</p>	<p>Agreed: Government vision from <i>Building the Information Society</i>: "Already, new learning technologies such as distance learning and computer courseware can provide a richer learning experience for today's students, equipping them to compete for jobs in the emerging knowledge society. As the Information Highway develops, these learning opportunities must expand as students at all levels gain access to a world of knowledge and learning resources. In the very near future, rather than thinking of learning as an educational experience completed early in life, Canadians will view it as an enriching lifelong process vital to their continuing employment and success. In this way, Canada will move to adopt a culture of lifelong learning as an integral part of its evolution to an information society."</p>

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Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Lifelong learning strategy: Rec. 14.2 called for a comprehensive strategy on lifelong learning. Elements of the strategy were also set out in 4.5, 6.13–6.15, 7.11, 7.19–7.23, 9.15–9.19, 11.19–11.28, 14.3–14.11 and 14.16.</p>	<p>Alternate Approaches: Though the federal government has taken action on a number of these recommendations, the concerted effort called for by the Council requires more intensive coordination of federal and provincial/territorial government efforts. In this report, the Council addresses this requirement by focussing its recommendations around a mechanism that would operate under the aegis of the Council of Ministers of Education, Canada.</p>
<p>Partnerships for lifelong learning on the Information Highway: Recs. 14.1–14.4 also set out the need for partnerships to build a lifelong learning strategy for Canada.</p>	<p>Government commitment: The Minister of Human Resources Development, in partnership with the provinces, territories and key federal departments and agencies, will facilitate and foster close collaboration among governments, learning institutions, sectoral councils, the private sector, business associations, labour organizations, associations for learning technology professionals, women's groups, community groups and other non-governmental organizations.</p> <p>Action taken: HRDC is conducting an assessment of potential impacts of the Information Highway on learning and human resource development, and identifying barriers to access. Results are expected in the fall of 1997. HRDC's Office of Learning Technologies has established a network of experts to develop learning technology initiatives. The National Literacy Secretariat also supports electronic networking and database services to promote literacy.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Action under way: Through the Council of Ministers of Education, Canada, as well as provincial/territorial ministries of education, action is under way to strengthen the supply of Canadian learning materials, "train the trainers" in use of the new technology and develop credit courses in the new technologies.</p>
<p>Learning technologies: Recs. 4.5, 9.15, 9.16, 11.25, 11.26, 11.28, 13.20, 14.1–14.4 and 14.8 call for several measures to ensure the diffusion and effective use of new learning technologies.</p>	<p>Action taken: HRDC's Office of Learning Technologies (OLT) works with a variety of partners to expand innovative learning opportunities for Canadians using new learning technologies. OLT contributes to the development of a lifelong learning culture in Canada through a variety of initiatives.</p>
<p>Networking and content for learning: In a variety of ways, Recs. 7.21, 7.22, 9.5, 9.10, 9.11, 11.19, 13.10, 13.11, 13.20, 14.2 and 14.3 emphasize the importance of networking and content in the context of learning.</p>	<p>Action taken: SchoolNet is a two-year-old federal government initiative partnered with provincial/territorial governments, the private sector and educational institutions. Its primary purpose is to provide Canadian students and teachers with exciting electronic services that will develop and stimulate the skills needed in the knowledge society. Today, SchoolNet serves more than 9 385 of Canada's 16 500 schools and 1 048 libraries with hundreds of on-line services and gets 2.5 million hits per month. Under the SchoolNet partnership, participants have agreed on a plan to put all of Canada's schools on-line by 1998. Under the First Nations component of SchoolNet, Industry Canada and the Assembly of First Nations has 350 of the 447 Aboriginal schools connected, using high-speed satellite access donated by the private sector. All remaining Aboriginal schools that want to be connected will be by the end of 1997.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Offensive content: Recs. 8.1–8.7 call for a variety of approaches to controlling illegal and offensive content on computer networks.</p>	<p>Actions taken: The Canadian Association of Internet Providers recently endorsed a seven-step voluntary “Code of Conduct” reflecting its commitment to check potential abuses.</p> <p>The federal government holds to the view that it has the right, as do all sovereign governments, to intervene with respect to illegal materials. The government is already reviewing law enforcement powers to ensure that criminal abuse and misuse of computer networks can be investigated.</p> <p>Industry Canada is now consulting on this issue with providers of information services on the Internet. In 1997, the department completed a major study on liability issues and is advancing these issues at the OECD.</p> <p>The Department of Justice issued in 1996 a consultation paper, <i>Undue Exploitation of Violence</i>, which sought public views on the measures that might be taken to respond to the distribution of violent material on electronic networks, including the Information Highway.</p> <p>Under study are the legislative, educational and technical measures recommended in 8.2, 8.3, 8.5 and 8.6.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
Government as a Model User	
<p>Electronic access to government services: Recs. 9.2, 9.4, 9.5, 9.10, 9.11, 12.2, 13.10-13.12, 15.1, 15.2 and 15.5 emphasized improving electronic access to government services.</p>	<p>Action taken: To ensure access by Canadians who lack a computer and modem, the Minister of Industry will work closely with provincial and territorial governments through the <i>SchoolNet and Community Access programs</i>, to ensure that government information and services are available through public access points located in community centres, libraries and schools. All schools will be connected by 1998. The 5 000 Canadian communities with populations between 400 and 50 000 will be connected by the year 2000.</p>
<p>Single electronic window: Rec. 9.1 called for a single electronic window on government. Recs. 5.1, 9.3, 9.4, 9.5, 9.9, 9.10, 9.11, 9.13, 12.2, 15.1, 15.2 and 15.5 called for a range of other measures to facilitate electronic access.</p>	<p>Action taken: In December 1995, Public Works and Government Services Canada (PWGSC) established its bilingual Canada Site on the Internet. This provides a single window for Internet users seeking access to government information and services, as well as direct links to other federal and provincial government Internet sites. The Canada Site has grown fivefold and averages over 75 000 hits per day. A new electronic government directory accessible through this site adds to its utility and responds to another of our earlier recommendations. PWGSC is also integrating the Canada Site, the Publiservice Intranet Site (for sharing information within the public service) and the Reference Canada call-centre services (through which Canadians get information over the phone).</p>

Table C-2 (cont'd)
Phase I Recommendations and
Government Actions

Phase I recommendations	Status
	<p>The governments of New Brunswick, Ontario and Alberta are now conducting pilot trials using the federal government's Government Enterprise Network (GENET), laying the basis for a single window for federal, provincial and potentially municipal information and services. Under the Community Access Program, the federal and New Brunswick governments have also signed a memorandum of understanding to make information from both governments available at more than 200 access points in the province. Another very promising development is Canadian Governments On-Line (CGOL), a joint project of federal, provincial, territorial and some municipal governments to make available on the InterGov Site an electronic catalogue of on-line government services.</p> <p>Action under way: At the September 1996 meeting of federal, provincial and territorial ministers responsible for the Information Highway, ministers tasked officials to develop proposals for joint electronic delivery of government services. These will be considered by ministers at their next meeting expected later in 1997.</p>
<p>Official languages: Recs. 7.3, 9.4, 13.14, 15.1, 15.2 and 15.5 raised either explicitly or implicitly the importance of using both official languages.</p>	<p>Actions taken: Treasury Board has developed Internet guidelines for federal institutions, covering use of official languages. In April 1997, Treasury Board developed a policy on the use of official languages on electronic networks, including the Internet. To increase the availability of information in both official languages, PWGSC is distributing <i>Termium</i>[®], its extensive French/English terminology database, on CD-ROM to other departments. There are now over 40 000 users of Termium in the federal government and agencies.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Electronic commerce in government: Recs. 9.1–9.6, 9.10–9.14, 10.8–10.19, 12.2, 12.5, 15.1, 15.2 and 15.5 all relate to introducing electronic commerce in government.</p>	<p>Action taken: In August 1996, PWGSC introduced the Secure Application and Key Management Service (SAKMS), a new common security service to support electronic commerce. SAKMS currently supports more than 200 clients in 20 government departments. The service provides government departments with most of the features necessary to use public key infrastructure technology. Features include message and transaction encryptions; digital signature capabilities and secure access to shared applications via the government's Intranet. In addition to SAKMS, PWGSC has introduced an electronic data interchange service (GEDIS), which acts as a common gateway to route and translate electronic information directly between the government's infrastructure and the business community as well as via the Internet.</p> <p>Action under way: The TBS has indicated that electronic commerce will become by 1998 the preferred means for the government to conduct its business. In March 1996, the government introduced amendments to the <i>Criminal Code</i> to address various kinds of computer crime. The Electronic Commerce Secretariat at the Department of Justice is surveying existing federal statutes to determine the types of impediments to electronic filing as a basis for developing legislative options. The Minister of Justice has proposed legislation by the year 2000, providing for the protection of personal data held by the private sector.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>The TBS has put in place a formal committee structure to direct and manage the development of the Government of Canada's PKI. Supervisory functions will be the responsibility of individual departments, while the TBS will chair the central body to establish policy. Full-scale deployment begins early 1998. By late 1998, the federal government should have in place a PKI. The TBS operates and chairs an interdepartmental committee, the Policy Management Authority (PMA), which is responsible for formulating central policy and establishing agreements for public key operation with organizations outside the federal government.</p>
<p>Setting the example: Recs. 12.2, 9.1–9.14, 15.1, 15.2 and 15.5 emphasize the importance of government using bold and innovative means to deliver services via the Information Highway.</p>	<p>Actions taken: The following represent some of the services now being electronically provided by the federal government:</p> <ul style="list-style-type: none"> • <i>Strategis</i> is Canada's largest business website, providing easy, direct access to Industry Canada's expertise and information resources, including 60 000 reports, 500 000 pages of searchable text, two gigabytes of statistical data, and hot links to Canadian and international business information databases. • 100 million payments are now made electronically every year, representing more than half of all payments made by the Receiver General of Canada. • 10 million people and companies have filed their income taxes electronically since 1993.

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<ul style="list-style-type: none"> • By January 1, 1997, all businesses dealing with Revenue Canada had a single Business Number (BN), a unique identifier for their dealings with the department's four main business programs and eventually with the government as a whole. This number will allow one-stop service for businesses, simplify their dealings with government, and reduce duplication and paperwork. By 1998, businesses will be able to register electronically. • Some 8 million clearances of customs have taken place electronically through 300 brokers. • In 1995, Canadians received electronically \$443 million in GST refunds and made electronic payments worth \$188 million. • Natural Resources Canada has introduced an electronic procurement system that cuts transaction costs by 43%. • Intellidoc, the electronic information service of the Canadian Institute for Scientific and Technological Information (CISTI) now receives 1 500 electronic orders a day. • The Inter Agency Committee on Geomatics is guiding federal, provincial and territorial governments and the private sector in the creation of a Canadian Geospatial Data Infrastructure that will allow rapid public access to digital maps and data for analysis and decision making. • Human Resources Development Canada now has in place 6 000 electronic service points for job seekers.

Table C-2 (cont'd)
Phase I Recommendations and
Government Actions

Phase I recommendations	Status
	<ul style="list-style-type: none"> • Agriculture and Agri-Food Canada has established a 24-hour interactive electronic information service (ACEIS), which provides timely and flexible single-window access to departmental news and announcements, market data and analysis, research and technology and regulations. The department is also conducting a pilot project for a Canadian Rural Information Service (CRIS), which will provide a clearing house for information on rural Canada. • The <i>Green Lane</i>, Environment Canada's award-winning website, makes available to Canadians a wide range of environmental information on human safety and health, environmental industries, environmental assessments and legislation, and scientific data for use in policy making. • Transport Canada and Revenue Canada have completed their feasibility studies and preliminary design work of intelligent transportation border crossing systems to speed customs, immigration processing and toll collection at land border crossings. Prototype systems at the Ambassador and Peace Bridges are now being tested. • Industry Canada's <i>Student Connection Program</i> subsidizes the wages of senior college and university students hired to introduce and train managers of some 50 000 small and medium-sized businesses in business applications on the Information Highway. The program is expected to create 2 000 jobs over its three-year life and takes a proactive approach to the hiring of female and Aboriginal students.

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<ul style="list-style-type: none"> As part of Industry Canada, Aboriginal Business Canada has supported the creation of <i>The Spirit of Aboriginal Enterprise</i>, a website that has been accessed 450 000 times since its launch, as the focal point for Aboriginal business on-line.
<p>Mission statement: Recs. 15.1 and 15.2 articulate a mission statement and role for government as a world leader.</p>	<p>Action taken: In <i>Building the Information Society</i>: the President of the Treasury Board and the Minister of Public Works and Government Services confirmed the government's commitment to act as a model user of information technology.</p>
<p>Deputy minister-level official: Recs. 9.20, 15.3 and 15.4 recommend such an official should be responsible for Information Highway implementation in government. Rec. 9.21 called for annual reports to Parliament.</p>	<p>No action to date: No deputy minister-level official has been appointed, nor has there been an annual report to Parliament. However, in spring 1997, a Chief Information Officer for the government was appointed in the TBS, which has the overall policy responsibility for the implementation of the Information Highway within government. In addition, the Treasury Board Information Management Subcommittee (TIMS) — a committee of deputy ministers — is sponsoring pilot projects addressing the common needs of certain kinds of clients across departments, as opposed to viewing electronic service delivery solely in terms of departmental jurisdictions.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Policy framework for common electronic information infrastructure: Recs. 4.1–4.4, 9.1–9.13, 12.2, 12.5, 13.13, 13.15, 15.1, 15.2 and 15.5 made policy recommendations for implementation of the Information Highway in government.</p>	<p>Action under way: This infrastructure continues to evolve in accordance with the plan for implementing the blueprint agreed to by Treasury Board ministers in fall 1995. The TBS, in collaboration with PWGSC and other departments, is now taking steps to make a government-wide electronic information infrastructure a reality. These steps include identifying key priorities, establishing implementation plans, suggesting means of funding, taking measures to encourage broad usage and developing an effective policy framework and structure for governance.</p> <p>Fundamental to this plan will be policy guidelines and application tools for information management, and technologies that allow an integrated approach to privacy, security and access to information questions. A critical concern will be to ensure the delivery of government services and information in both official languages as well as to the elderly, people with special needs and those living in remote and rural areas.</p>
<p>Implementing the infrastructure: Recs. 4.1–4.4, 9.1–9.13, 12.2, 12.5, 15.1, 15.2 and 15.5 also urge the government to hasten development of the infrastructure, using existing infrastructure where possible.</p>	<p>Action taken: Elements of such an infrastructure are in place. PWGSC now manages an Information Highway internal to government and largely leased from the private sector, which includes a digital backbone network, a common intercity voice network, local telephone systems, a frame relay service, an Ottawa-area, fibre-optic network, the Government Enterprise Network, a mobile satellite communications service and a variety of inter-networking technologies.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
<p>Government procurement: Recs. 9.13 and 15.6 focus on the strategic role of procurement in developing domestic information technology industry.</p>	<p>Action taken: The Government <i>Electronic Tendering Service</i> provides Canadian companies across the country an opportunity to obtain information on government contracts electronically through a single window. Companies can get information about federal contracts as well as provincial ones.</p> <p>Action under way: There is a growing shift away from in-house development and in-house procurement of information technology. Increasingly, government is relying on off-the-shelf software and commercial systems, as opposed to trying to reinvent the wheel. The government is also defining the necessary "core competencies" of government in the information technology field and is looking to the private sector to provide, not only equipment, software, systems and telecommunications services, but also electronic information and services.</p>
Policy Coordination	
<p>Federal/provincial/territorial coordination: Rec. 5.1 called for such coordination, while Recs. 5.2 and 12.1 called for regulatory reform at all levels.</p>	<p>Actions taken: The first ever meeting of federal, provincial and territorial ministers responsible for the Information Highway took place in Winnipeg in September 1996. Ministers agreed to task officials to develop specific proposals for continuing collaboration where appropriate in the areas of access, electronic commerce, delivery of government services and protection of personal information. These proposals will be considered at the ministers' next meeting later in 1997.</p>

Table C-2 (cont'd)

Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>At the federal level, the creation of a pro-competitive policy and regulatory framework favourable to convergence in the communications and information industries is almost complete. These will result in a significant reduction in regulatory barriers to fair competition.</p> <p>Within the federal government, a senior interdepartmental committee under Industry Canada leadership prepared and coordinated action across government in response to the Council's first report.</p> <p>No action to date: The federal/provincial/territorial process set in motion in September 1996 could lead to a more coordinated effort to streamline regulations at all levels of government. Individual jurisdictions have already moved forward in this area.</p>
<p>International coordination: Recs. 5.3 and 9.8 called for a strengthening of Canada's support of international efforts to build a global Information Highway.</p>	<p>Actions taken: Canada plays a leadership role in G-7 pilot projects, the economic policy work of the OECD and other fora. Canada was also a signatory of the Agreement on Basic Telecommunications Services under the General Agreement on Trade in Services (GATS) concluded in February 1997. In developing the Canadian position for the negotiations, the federal government consulted extensively with Canadian companies. Under the new agreement, 69 countries will move to open their markets for telecommunications services to greater competition from outside. Close collaboration between the federal government and industry is central to Canada's active participation in international standards fora.</p>

Table C-2 (cont'd)
Phase I Recommendations and Government Actions

Phase I recommendations	Status
	<p>Canada also works to ensure developing countries become full participants in the global information society through such fora as the May 1996 Information Society and Development Conference in South Africa. Canadian development agencies such as the Canadian International Development Agency and the International Development Research Centre place high priority on helping to strengthen the information infrastructures of developing countries.</p>

